



The Arc/k Project Digital Preservation Policy

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Introduction

The Arc/k Project's mission is the digital conservation and protection of humanity's collective culture and history to ensure the preservation of thousands of years of artistic brilliance and creativity. To this end, The Arc/k Project actively promotes and shares accessible digital documentation methods that empower citizen scientists, volunteers, cultural heritage organizations and indigenous communities in our global community to document and archive their own cultural heritage while adhering to ethical practices. By creatively expanding the use and accessibility of cutting-edge technology, the systematic preservation of cultural heritage by culturally affiliated stakeholders is becoming increasingly achievable. Through partnerships that espouse mutual knowledge sharing experiences, The Arc/k Project seeks to contribute to the evolution of ethical standards in digital cultural heritage through academic papers, standards forums, conference presentations and listening sessions.

The Digital Preservation Policy supports this mission and follows the written policies for collection development, access control, and ethics for archiving and preserving primary source images from Producers, so accurate digital models and experiences can be recreated by future generations at technology advances. This Digital Preservation policy provides a basis from which detailed requirements can be identified, a consistent foundation for practical solutions can be recognized, and organizational, partner, and stakeholder buy-in can be secured for digital preservation function. These policies and procedures link to the technical features of its third-party service, Libsafe – Libnova's OAI aligned digital preservation platform for digital preservation.

OAIS Compliance

The Arc/k Project has accepted the long-term responsibility to preserve its digital collections and make them available for its Designated Community. The Arc/k Project recognizes the need to comply with a common framework to ensure long term digital preservation and by conforming to the minimum requirements established for an OAIS Archive. The Arc/k Project is committed to following the principles adopted and maintained in the OAIS reference model in its preservation processes and objectives (CCSDS Secretariat, 2012).

Purpose & Rationale

Mandate

The mandate for digital preservation at The Arc/k Project is as follows:

- *Access*: it is committed to advanced technological innovations and a coordinated global involvement to preserve endangered cultural assets and continue to make them accessible as cultural and legal protocols dictate.
- *Employ emerging archival preservation standards*: it holds a responsibility towards the standards and practices of the digital preservation community as well as active participating in the development of new and emerging standards for digital 3D objects.
- *Community diligence*: it is dedicated to a constant and earnest effort to ensure that proper legal requirements as well as ethical and practical archival practices are observed.
- *Grant funding and partnerships*: it takes proactive measures to be considered for ongoing grant opportunities intended to support future preservation projects and activities.

Audience

The audience for its digital collections includes:

- World heritage preservation organizations (UNESCO, ICOMOS, ICOM)
- Illegal Artifact Law Enforcement (FBI, INTERPOL)
- Educators and the general public

Designated Community

Its Designated Communities are:

- Photogrammetry Processors for the tools and technologies used in the photogrammetry process that will provide primary source images for the creation of 3D models.
- Museum, Archivist, and Cataloging Specialists who have a need for provenance metadata (descriptive and administrative) related to primary source images and original 3D objects.
- Cultural heritage institutions, organizations and Indigenous communities who are equal partners in knowledge sharing. This includes understanding and adhering to cultural protocols and alternative ownership values, as well as providing resources and training to encourage communities to digitally preserve their own cultural heritage.

Risk Management

The Arc/k Project is committed to transparency and accountability in all its actions and practices ongoing risk management in its digital preservation strategies. The following are issues and risks specific to the organization for the permanence of its digital resources (mitigation of these risks is further explained in *Preservation Actions and Quality Control*):

- Outsourcing with little consideration of future preservation needs
- File format obsolescence making it expensive or impossible to process digital information
- Media obsolescence making it expensive or impossible to recover digital information
- Media degradation
- Loss of contextual information resulting in loss of meaning
- Deprivation of resource discovery metadata resulting in difficulty retrieving digital information
- Loss of copyright, licensing or other legal information resulting in uncertainty over rights and obligations
- Loss of provenance information or fixity resulting in a loss of authenticity

Objectives

The Arc/k Project addresses the following objectives in its digital preservation processes:

- Take action to protect its most vulnerable digital information
- Ensure that access to digital resources is maintained throughout their entire lifecycle preserving both contextual and provenance information
- Ensure that processes implemented across the organization adhere to digital preservation standards
- Uphold the organization's investment in the creation of digital resources and the photogrammetry process
- Commit to using the most efficient archival storage technologies to mitigate data storage costs
- Contribute and participate in the development of new and emerging digital 3D preservation standards and adopt these practices into ongoing digital preservation strategies
- Meet the preservation and access requirements of funding agencies and primary user communities
- Foster collaborative partnerships to sustain digital preservation efforts and make the best use of available resources

Organizational Commitment

Operating Principles

The Arc/k Project's preservation efforts and operating principles follow those adopted in the OAIS reference model to effectively enable long term preservation of its digital collections. The Arc/k Project strives to:

- Establish explicit selection criteria for determining which materials are appropriate for inclusion

- Obtain sufficient intellectual property rights to meet preservation objectives
- Determine an accurate description of the Designated Community to ensure that digital objects are independently understandable over time
- Establish clear policies for carrying out preservation activities and make these policies available to the user community and stakeholders
- Manage a catalogue and asset register for primary source images and 3D objects to maintain a reliable and sustainable digital archive
- Establish procedures for evaluating its third-party digital preservation services for storage, quality control, and security

Roles and Responsibilities

The Digital Archivist, Photogrammetry Supervisor, and Production Coordinator along with the Founder, Executive Director and members of the board all contribute to the management of digital preservation and the entire lifecycle of The Arc/k Project's digital information.

The Digital Archivist manages the organization's digital content, collaborates with organizations and individuals around the world to digitally archive and protect their own cultural heritage through visual technologies, and advocates for ethical and universal 3D metadata standards.

The Photogrammetry Supervisor has extensive knowledge and experience in shooting photogrammetry in studio and on location for archival purposes, as well as post production processing. She has worked with museums and cultural institutions in the United States and abroad, has led teams on location during photogrammetry shoots, and has taught the best methodologies for capturing subjects for photogrammetry to people locally and abroad.

The Production Coordinator manages production and workflow for all ongoing and future projects.

The Founder and Executive Director seeks to harness and develop emerging technologies on behalf of pressing humanitarian issues. With these priorities in mind, he spearheaded the creation of this organization which helps societies in extremis digitally archive that which is too valuable, too important, or too unique to be lost or forgotten. The Arc/k Project was created to straddle the gulf between scientific archiving and activism.

Selection and Acquisition

The Arc/k Project's General Collections and Management Policy provides a framework and a set of criteria for the selection and acquisition of digital content and is designed to support the mission of the organization. It aids in decision-making by providing guidance and determines the priorities attached to digital preservation activities. Serving as a channel of communication, this policy along with the Collections Policy for Indigenous Communities and Institutional Ethical Guidelines are publicly available on The Arc/k Project's website or upon request.

Access and Use

The Arc/k Project recognizes and accepts its responsibility to provide the proper management, preservation and use of the collections and associated information it holds in its care. The Arc/k

Project's staff have legal, ethical and professional obligations to maintain high levels of honesty and integrity in their workings with partners and volunteers who contribute intellectual or digital contributions to its collection.

When working with cultural heritage objects or locations, special care is taken to identify and accommodate culturally affiliated stakeholders and adhere to their unique practices, contextual descriptions and protocols. The Arc/k Project recognizes that Indigenous peoples and communities have historically suffered theft and financial exploitation of their cultural heritage by institutions and non-indigenous peoples in the past. The Arc/k Project stands in opposition to these past colonial practices and believes that culturally affiliated communities should be the prime stakeholders of their own cultural heritage, for physical artifacts and locations as well as digital representations derived from them. For more information, see The Arc/k Project Native American Collections Policy (add link).

Challenges

The challenges faced by The Arc/k Project in their digital preservation efforts include:

- *Ownership of material:* Raw files provide the highest quality and flexibility of digital image formats, but the proprietary nature of raw files means there is a risk that any given format will not be supported for the long term. Data elements are encrypted within a raw format which forces the use of the manufacturer's software for post-processing. Formats like Adobe's DNG format intend to mitigate this risk by normalizing camera raw data (Arms, et al., 2017).
- *Principles for selection:* There are a number of principles to consider in the selection of digital material for long-term preservation. The Arc/k Project must take into consideration curatorial review, preparation and verification of metadata, and the determination of value to its Designated Community (RLG/OCLC et al., 2002).
- *The need for standards:* Currently, there are no standards for digital 3D preservation metadata. The working group on the Community Standards for 3D Data Preservation (CS3DP) has begun the process of developing standards for the preservation of digital 3D objects, but in the meantime, a metadata map has been created for preservation activities combining elements from community standards most suitable for 3D objects.

Financial Commitment

The Arc/k Project has identified adequate operating budgets to support its digital preservation efforts and infrastructure. To sustain these efforts, The Arc/k Project will adhere to the business plan in place and will continue to demonstrate an ongoing commitment to digital preservation activities for external funding opportunities (RLG/OCLC et al., 2002). In an effort to continue its digital preservation practices, The Arc/k Project will attempt to secure partnerships with world heritage preservation organizations and Illegal Artifact Law Enforcement to fund digital preservation initiatives. As a shared community responsibility with native nations and peoples, The Arc/k Project acknowledges the cooperation and collaboration of its digital preservation requirements and responsibilities, and therefore, wishes to engage in long-standing partnerships with these communities as well as other digital archives, digital repositories, and data producers both locally and globally (The Regents of the University of Michigan, 2019).

Preservation Actions and Quality Control

The National Digital Stewardship Alliance Levels of Digital Preservation

In assessing the levels of preservation achieved for the specific materials in the Arc/k Projects custody, the organization is participating at a Level 3 or 4 in all categories based on Libsafe's technical features. Table 1 shown below is Version 1 of the Levels of Digital Preservation and the bolded text in each functional area are the actions currently in place for digital preservation workflows and processes (Phillips et al., 2013).

Table 1: Version 1 of the Levels of Digital Preservation

	<i>Level 1 (Protect your data)</i>	<i>Level 2 (Know your data)</i>	<i>Level 3 (Monitor your data)</i>	<i>Level 4 (Repair your data)</i>
<i>Storage and Geographic Location</i>	- Two complete copies that are not collocated - For data on heterogeneous media (optical discs, hard drives ect) get the content off the medium and into the storage system	- At least three complete copies -At least one copy in a different geographic location -Document your storage system(s) and storage media and what you need to use them	-At least one copy in a geographic location with a different disaster threat -Obsolescence monitoring process for your storage system(s) and media	one copy in a geographic location with a different disaster threat comprehensive plan in place that will keep files and metadata on currently accessible media or systems
<i>File Fixity and Data Integrity</i>	- Check file fixity on ingest if it has been provided with the content - Create fixity info if it wasn't provided with the content	-Check fixity on all ingests -Use write-blockers when working with original media -Virus check high risk content	-Check fixity of content at fixed intervals -Maintain logs of fixity info; supply audit on demand - Ability to detect corrupt data -Virus check all content	-Check fixity of all content in response to specific events or activities -Ability to replace/repair corrupted data - Ensure no one person has write access for all copies
<i>Information Security</i>	-Identify who has read, write, move and delete authorization to individual files -Restrict who has those authorizations to individual files	-Document access restrictions for content	-Maintain logs of who performed what actions on files, including deletions and preservation actions	-Perform audit of logs
<i>Metadata</i>	-Inventory of content and it's storage location -Ensure backup and ono-collocation of	-Store administrative metadata -Store transformative metadata and log events	-Store standard technical and descriptive metadata	-Store standard preservation metadata

	<i>inventory</i>			
<i>File Formats</i>	<i>-Store standard preservation metadata</i>	<i>-Inventory of file formats in use</i>	<i>-Monitor file format obsolescence issues</i>	<i>-Perform format migrations, emulation and similar activities when needed</i>

The Libsafe platform is Libnova's solution for digital preservation and it takes on a global approach considering the preservation process as a whole. It is driven by the most worldwide accepted preservation standard (ISO 14.721 – OAI) and keeps a 'look-through model' allowing the user to have total control over the status and location of their digital collections. It is an active platform permitting easy evolution of digital collections so it will always remain accessible (Libnova, 2014). See Libsafe's Technical Features of the Preservation Process that align with the actions currently in place based on the NDSA's tiered set of recommendations.

Standards and Best Practices

The Arc/k Project implements the following community-agreed standards and organizational models for preserving primary source images and ensuring long-term access to 3D objects:

- International Press Telecommunications Council (IPTC)
- Dublin Core Metadata Element Set
- DPLA Metadata Application Profile
- Smithsonian 3D Digitization
- Sketchfab platform

Additionally, The Arc/k Project meets the international standard for its physical environment, backup and recovery procedures, and security systems:

- The Open Archival Information System (OAIS) Reference Model (ISO 14.721)

Metadata Creation

The Arc/k Project has developed a unique metadata schema that combines elements from the standards and best practices listed above for its digital 3D objects and it has defined its primary source images in accordance with the EXIF specifications. Its digital collections include descriptive, administrative, and technical metadata and it uses the Getty Art and Architecture Thesaurus for tags and keywords. The project maintains a master list for controlled vocabulary and a master file for every unique ID number applied to 3D objects. The following is a list of the metadata created for 3D objects that will be used on ingest with some elements included in the online catalog:

Name	IECODE	Metadata Type
Address	address	LOCATION
Affiliated Institution/Organization	contributor_website	DESCRIPTIVE

Link		
Affiliated Institution/Organization(s)	contributor	DESCRIPTIVE
Alternate Title(s)	alternate_title	DESCRIPTIVE
Arc/k ID	identifier	IDENTIFIER
Arc/k Piece Number	arck_piece_number	DESCRIPTIVE
Artist/Architect(s)	creator	DESCRIPTIVE
Background removal method	background_removal_method	TECHNICAL
CC Rights Statement	cc_rights_statement	DESCRIPTIVE
Calibration Object Used	calibration_object_used	DESCRIPTIVE
Capture Device (manufacturer and model)	manufacturer	DESCRIPTIVE
Capture Image File Type(s)	capture_data_file_type	DESCRIPTIVE
City	city	LOCATION
Community/Culture	community	DESCRIPTIVE
Contributor Contact	contributor_contact	DESCRIPTIVE
Country	country	LOCATION
Description	description_object	DESCRIPTION
Face count	face_count	TECHNICAL
Geolocation	latlng	LATLNG
Has Service (IIIF Base URL)	has_service	DESCRIPTIVE
Is Referenced By (Manifest URL)	is_referenced_by	DESCRIPTIVE
License	license	DESCRIPTIVE
Light Source Type	light_source_type	DESCRIPTIVE
Local Accession Number	accession_number	DESCRIPTIVE
Location	location	LOCATION
Miscellaneous Notes	notes	DESCRIPTIVE
Model Creation Date	date_of_creation	DESCRIPTIVE
Model Format	model_file_type	TECHNICAL
Model Modality	model_modality	TECHNICAL

Model Size (MB)	file_size	TECHNICAL
Model Triangles	triangles_count	TECHNICAL
Model Vertices	vertices_count	TECHNICAL
Object Dimensions	object_dimensions	DESCRIPTIVE
Object Medium(s)	medium_type	DESCRIPTIVE
Object Patch	object_path	SYSTEM
Original Creation Date (by artist/architect)	date_created	DESCRIPTIVE
Photogrammetry Processor(s)	actor_name	DESCRIPTIVE
Point count	point_count	TECHNICAL
Project	project_name	DESCRIPTIVE
Public Access	public_access	DESCRIPTIVE
Rights	rights	DESCRIPTIVE
Rights Holder	rightsHolder	DESCRIPTIVE
Scale Bar ID	scale_bar_id	DESCRIPTIVE
Scale Bar Manufacturer	scale_bar_manufacturer	DESCRIPTIVE
Source Image Capture Date	date_of_capture	DESCRIPTIVE
Source Image Capture Method	capture_method	DESCRIPTIVE
Source Image Count	capture_image_count	DESCRIPTIVE
Source Image Photographer(s)	collected_by	DESCRIPTIVE
Source Label	source_label	DESCRIPTIVE
State/Province/Municipali ty	state_province	LOCATION
Subject(s)	subject	DESCRIPTIVE
TK Label	tk_label	DESCRIPTIVE
TK License	tk_license	DESCRIPTIVE
Tags/Keywords	keywords	TAG
Target Type (Scale Bar)	target_type	DESCRIPTIVE
Thumbnail Path	thumbnail_path	THUMBNAIL
Title	title_object	TITLE
UV space	has_uv_space	TECHNICAL
Vertex color	has_vertex_color	TECHNICAL

Risk Mitigation

Libsafe can execute risk analysis reports on a specific object, a preservation area, or the whole collection. Based on Libnova's knowledge database, risk analysis reports can include the number of optimal copies, obsolete or under potential obsolescence risk formats, and unrecognizable formats. Through this technology surveillance process, the status and potential risks of preserved objects will always be updated and available.

Training and Education

Adequate training and continuous professional development will be given proper attention and allocation to ensure that the expertise and competencies of current staff members continue to be appropriate for maintaining a digital preservation program. This may include training courses and curriculum (face-to-face or online), conference attendance and participation, and outreach programs with careful consideration for the skills that are required for specific roles and responsibilities – skills that will meet the needs of current and future preservationists, metadata specialists, systems specialists, archivists, and legal specialists (NEDCC, n.d.; Digital Preservation Coalition, 2019).

Continued training and education will help staff to exploit technology effectively, enhance individual level job satisfaction and commitment, and improve the strategic outlook for the organization. The Arc/k Project will remain responsive to training and development needs as well as actively exchange learned information with other staff members to create a successful collaborative environment. Taking a strategic approach for advocacy and skills development will be an important part of The Arc/k Project's digital preservation activities (Digital Preservation Coalition, 2019).

Monitoring and Review

To ensure this policy document remains current and relevant it will be subject to review annually or as a result of major organizational or environmental changes. Libnova applies the TRAC/ISO16363 (Trustworthy Repositories Audit & Certification) to its audit process and regular monitoring of the digital environment will guarantee that the digital information stored remains accessible to, understandable by, and sufficiently usable by the Designated Community (CCSDS Secretariat, 2012).

Regular review will require:

- Monitoring technology functions including staying up to date on emerging technologies and standards
- Automatic and/or scheduled audits to keep the same status of digital objects under which they were preserved
- Checks for integrity and format risks to detect and correct errors
- File format analysis and goals for migration and emulation

- Detailed reports whenever possible to identifying affected objects, their risks, and possible solutions

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