

Digital Archiving Technologies, Practices and Ethical Guidelines in Crowd-sourced and Community-based Efforts in Culturally Endangered Societies

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Abstract

The inclusion of citizens as part of the cultural heritage community is a recipe full of promise (with a pinch of peril). In an era in which technology allows for lay people with very little training to collect immense amounts of in-the-field data pertinent to cultural heritage archiving, it behooves institutions to actively encourage and mature such activation by enthusiastically instructing and guiding this large and varied segment of the community through best practices. Although using data from individuals with little to no working knowledge of the intricacies of digital preservation is not feasible, it is equally unreasonable to dismiss such a massive and equipped population as completely unworthy. The Arc/k Project's work in conjunction with citizens and communities across the globe demonstrates that a middle ground can achieve verifiable results with limited resources and in areas that are most in need of preservation.

Stating the obvious:

A large part of the world's human resources is not utilized to preserve endangered cultural heritage. Citizen scientists, or volunteers in the community that have a passion for the cause but aren't necessarily well-versed in the practice of scientific research/inquiry, or at least the particular research/inquiry that they are participating in, have a role to play. In today's digitally integrated world, the newly lowered threshold for collaboration allows this group to be engaged as never before. The Arc/k Project actively helps this cause by harnessing people's desire for cultural preservation and training them on just the aspects that are needed for photogrammetric capture in order to logarithmically increase the number of people contributing to the digital cultural heritage community.

The challenge:

While there are legions of people who can be trained to contribute to the cause there are remaining hurdles. Although the initial IMLS-funded 'Community Standards for 3D Data Preservation' report is to be published this summer, [1] there is currently no consensus on an agreed upon comprehensive standard for 3D digitization, and we acknowledge that not all of the data that is produced by citizen scientists may be considered archival. Those problems can only be ameliorated in time with additional community efforts, but in the interim we can teach current best practices to volunteers by taking into account their available resources. In the case of 3D objects, we provide accessible learning tools and live remote interactive training for photographic data capture intended for photogrammetric analysis and modeling [2]. Limits on quality and resolution of available equipment bring their own demands and challenges, making it

necessary to take into account that not all participants in citizen-enabled heritage archiving projects have the highest-end gear ideal for capture, a fact that we must adapt to in our post-processing workflows. For those institutions who cannot simply throw money at the problem—funding limitations nor slavish adulation of the latest technologies are legitimate reasons to lock out citizenry from this grand and desperately necessary endeavor.

The empowerment of people:

A group of trained volunteers can offer advantages that no institution, regardless of its financial endowment, can hope to achieve. Ubiquity, access, personal importance and enthusiasm, and a more inclusive, class-independent view of what constitutes "culture" are all elements that can greatly aid in the digital capture of cultural heritage data. The inclusion of citizen scientists' efforts as part of what we call the cultural heritage community empowers that community through: vastly expanded data acquisition potential; response times that would otherwise be impossible; help in selecting and refining local objects of importance; and greater abundance of culturally relevant metadata as generated by the culture in question—all in their own language and according to their own priorities. Additionally, in cases where natural disasters, war or civil unrest may prevent digital capture specialists to be on the scene, local communities offer the best chance to move quickly to digitally record cultural heritage that may well be in imminent existential danger. Better yet, in cases where threats to cultural heritage can be anticipated, there is an opportunity to harness these vast community volunteer resources to preemptively digitally archive objects and sites that will probably be lost, stolen or destroyed within the next generation or two.

The approach:

We seek to digitally preserve cultural heritage in target areas that have the greatest chance of loss or destruction in the near future. We partner with local organizations, indigenous communities and citizen scientists who are willing to undergo an intensive course and be provided the specific resources required to establish an ethical, viable and verifiable means of digital capture and preservation, primarily via thorough photogrammetric instruction.

In areas such as Venezuela, which is currently inaccessible to The Arc/k Project, remote training is employed and achieved through multiple video conferences in combination with round-tripping of capture data and versions until sufficient photogrammetric coverage allows for a viable and detailed solve of a particular cultural heritage object. Feedback, such as providing a 3D display of camera angles and placement, affords us the ability to reinforce best practices with examples that the

photographers shot themselves, removing some of the more abstract pedagogy that can be inherent in photogrammetric training.

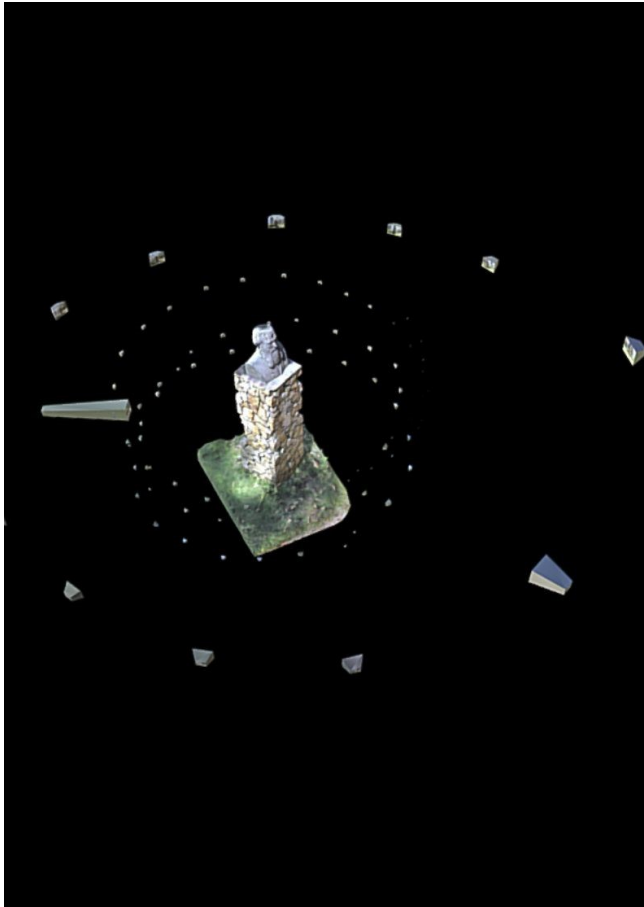


Figure 1: Monument to José Vicente Nuce (with cameras), El Rincón de los Poetas park in the city of Mérida, Venezuela. Photographed by Marinela Araque Rivero, Samuel Leonardo, and Hurtado Camargo.

Ongoing consultations with The Arc/k Project by the citizen scientist team regarding equipment, copyright/ownership, data storage options, and display of various 3D proxies for local education are all aspects of our mission to ultimately make groups and institutions self-sustaining in their own Cultural Heritage capture initiatives.

Various modalities of transparency:

The Arc/k Project recognizes the importance of standards and works diligently with citizen scientists and volunteer communities to embrace them whenever possible. When certain aspects can't be achieved due to circumstance, we stress to the team on the ground the additive nature of photogrammetry and request follow up shoots with better tools or techniques if they become available at a later date.

Provenance collection and digital transparency are key elements that The Arc/k Project strives to incorporate into every aspect of its capture workflow and archiving pipeline.

In our recent work with volunteers in Venezuela, we have pointed out the importance not only of measurement tools, but also of the need for accurate and extensive descriptive note-taking regarding the subject to bring as much context to the

culture being captured as possible. As some of these objects are captured in urgent or emergency situations, we emphasize to our volunteers the need for abundant and raw notations as the object may well be lost along with any context and description that could only be gathered at the location.

On Photogrammetry Videos and Tutorials With Built-in Standards:

The use of photogrammetry tutorials has allowed the initial intro to the technique to be done prior to our involvement. Volunteers are directed to test out their skills prior to the first video conference with our in-house team through our video tutorial that touches on all major points of photogrammetry. By building in expected standards and ethical practices from the beginning, a strong foundation for future learning can be created. Trainings are appropriately modified to accommodate local needs. For example, in our Venezuela efforts The Arc/k Project made sure to create a video tutorial that was presented by an actor who spoke in colloquial Venezuelan Spanish [4] in order to ensure a minimal translational loss.

On Redundancy:

As with standard museum photogrammetry, we stress the importance of redundancy when capturing and storing data. The institutional preservation of RAW files in multiple storage locations is a sound and standard practice, but we believe that the culturally affiliated community should also (and in some cases unilaterally) be caretakers of their own digital heritage by preserving a copy themselves. This benefits the local community by giving them control of their own digital heritage, but also ensures the existence of a verification tool should other copies become altered in the future by stakeholders outside the community. Each local institution or individual lies on a spectrum regarding their existing storage backup infrastructure, so on a case-by-case basis, The Arc/k Project aids in laying out the optimal options for short- and long-term backups.

Since many cultural heritage objects being captured are in places of civil unrest and could be damaged or destroyed, we ask photographers to capture more than is necessary for extensive coverage of said heritage. Redundancy not only improves the ultimate 3D model but may also serve as a last record of the cultural heritage item prior to destruction, vandalism or loss.

On Source Image File Standards:

The Arc/k Project promulgates the use of interoperable non-proprietary file standards whenever possible as a reliable means of provenance and future-proofing the transparency of the data for as long as possible. Limitations on commercially available resources that live up to typical heritage standards make such interoperability and longevity difficult (especially in regions that only have access to outdated equipment), but we continue to educate photographers to adopt current file standards when possible, and in some cases, copies of the files are converted to standardized archival formats when objects are placed into preservation.

On the Findability and Access of Data:

We also view VR as a powerful way to increase searchability for scholars. The Arc/k Project has tested out forms of metadata and raw photo retrieval that are almost instantaneous and can be accessed remotely or in-house. An example of this might be an antiquities expert who wishes to walk through Palmyra and choose portions of the 3D model that are of interest. A toolkit allowing for the selection of a section of the model in real time will allow for the photos that were taken from that selection to be uploaded directly for their further analysis.

On Cultural Heritage Ownership and Access:

As paramount as data transparency and access are to our efforts, these notions may not always be appropriate for cultural heritage. Different cultures and communities espouse various ways of knowledge and ownership which creates circumstances where it may not be ethically possible to observe optimal euro-centric standard practices. However important we believe that transparency and access are to the legitimacy and promulgation of treasured digital heritage, we put an even greater weight on the desires of the culturally affiliated community stakeholders to retain their own access protocols and intellectual control over the digitized materials. In cases with multiple stakeholders, we encourage parties to consult amongst themselves to determine the best access protocols and transparency levels for their own heritage. In typical partnerships, there is an equitable exchange of knowledge that often results in ethical and unique accommodations.

As an example, in our partnerships with indigenous communities, we encourage the use of Traditional Knowledge (TK) labels [5], established by Local Contexts, which adds existing local access protocols to digitized cultural heritage that is viewed outside of community contexts. This is especially useful when applied to sacred or ceremonial objects that are associated with gender, seasonal and other conditions of use. Metadata elements affiliated with cultural heritage are also made available that is often missing in typical metadata standards and maps. This includes the affiliated culture and/or community, contact information as well as information on how appropriate permissions may be arranged. [6]

Regarding copyright and ownership of digital content, The Arc/k Project views culturally affiliated communities as the primary stakeholders and stewards of their own cultural heritage, both terrestrial and digital. As 3D digitization of cultural heritage becomes more prolific, we in the digital preservation domain have a responsibility to not repeat the past colonial practices of western countries and institutions who appropriated foreign culture by taking possession and “ownership” of materials. This practice is manifested again today when institutions and organizations copyright and restrict access to a culture’s digital content and data without the affiliated communities consultation or approval - which some are now calling “digital colonialism.”[7] We feel the best ethical practice is for the culturally affiliated stakeholders to grant a license to The Arc/k Project as agreed upon in a Memorandum of Understanding.

Ethics and authenticity:

Along with provenance, transparency itself is an inherent ethical practice that can, when appropriately applied, help combat fraud, misuse and misappropriation of digitized cultural heritage. Standards are critical, but without full transparency of source data they can be used to provide cover for inauthentic digital models. It is only through the release and publication of source data by which reproducibility can be achieved by a qualified third party for independent verification.

An institution or organization could proclaim their adherence to standards of authenticity while flagrantly manipulating data and passing it off as authoritative to the community at large. As important as standards are, they should never be used as a tool to cover up inauthentic 3D models. As full transparency becomes more widely practiced, it can dissuade those who might be tempted to artificially alter digital models. Being that digital archivism is still a young field, it is important not only for our domain, but also for those we seek to aid in preserving their own culture that such forms of inauthentic digital manipulations are not permissible and a verification counterweight (albeit currently a passive one) is in place.

The result:

Through our efforts in Venezuela, Syria, and with indigenous communities of North America, The Arc/k Project seeks to model what can be achieved through ethical partnerships which embrace mutual knowledge sharing and training via technical innovations such as remote teaching and VR classrooms. When like-minded localized citizen scientists, community volunteers and organizations mobilize, train and agree on basic standards, then invaluable provenance and metadata can be successfully associated and preserved with 3D models. When technical, administrative and localized descriptive data is transparent and appropriately shared, it can promote higher ethical standards of authenticity, which benefits both our archival community and the communities we partner with to preserve cultural heritage.

Please see our photogrammetric references from past projects [3]

The future:

By preserving a digital version of an object, monument, or landscape, The Arc/k Project is promulgating a decentralized, non-colonial, and non-patrimonial, option for said communities to use all the same digital tools without going through an institution to access, archive, and display their own outputs. Through transparency of technique and the open documentation of data collection, it is our goal to have this material used worldwide for scholarly study and research in addition to the immense benefits that said data has within the community in which it was captured.

The Arc/k Project is aware that there are numerous challenges ahead for citizen-scientist initiatives to scale up, not the least of which will be a financial component that will need to be dealt with in the future within the global community.

References

- [1] <http://gis.wustl.edu/dgs/cs3dp/>
- [2] <https://arck-project.org/photogrammetry-learn-how-to-shoot/>
- [3] <https://collections.arck-project.org/>
- [4] https://arck-project.org/es_ES/photogrammetry-learn-how-to-shoot/
- [5,6] <http://localcontexts.org/tk-labels/>
- [7] <https://www.npr.org/sections/alltechconsidered/2018/05/21/609084578/3dscans-help-preserve-history-but-who-should-own-them>

Author Biographies

Brian Pope, a writer, director, entrepreneur and philanthropist, founded The Arc/k Project, a non-profit organization, in early 2015. Pope seeks to harness and develop emerging technologies on behalf of pressing humanitarian issues. He spearheaded the creation of this

organization in order to aid societies in extremis to digitize that which is too valuable, too important, or too unique to be lost or forgotten.

Scott Purdy majored in Anatomy/Physiology, graduating with a BS from the University of California, Santa Barbara. Transitioning to a more creative field, his career in film post-production began in 2003. He has collaborated with directors, producers, and cinematographers on a wide range of projects. As the Director of Operations at Arc/k, he relishes the challenge of using his experience to bring together technology and people to help further the cause of digital cultural preservation.

Michael Conyers is the digital archivist for the Arc/k Project and holds an MLIS degree from the University of Washington. In his current role, Michael manages the non-profit organization's digital collection and its archival preservation standards and practices. He is a working advocate for ethical 3D standards and collaborates with communities around the world to digitally capture and preserve their own cultural heritage via engaging visual experience.