Narrative Section of a Successful Application

The attached document contains the grant narrative 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 NEH Division of Preservation and Access application guidelines at http://www.neh.gov/divisions/preservation 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, 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: Digital Video Commander

Institution: Moving Image Preservation of Puget Sound

Project Director: Rachel Price

Grant Program: Research and Development

ATTACHMENT 1: Narrative

INTRODUCTION: DIGITAL VIDEO COMMANDER

Moving Image Preservation of Puget Sound (MIPoPS) is requesting supporting funds via a Tier II National Endowment for the Humanities Research and Development (NEH R&D) grant to expand the *DV Rescue* project's scope beyond its focus on the DV family of videotapes, to build upon our findings and community work, and to encompass the development of new preservation strategies and tools for most digital videotape formats. This expansion project, *Digital Video Commander,* will entail two years of work to research the challenges and opportunities of digital videotape preservation, develop open-source and freely available software, facilitate user testing, and create documentation to help define and perform comprehensive, automated, and intuitive data migration techniques. MIPoPS will collaborate with RiceCapades, a consulting and development company, and nine partner institutions currently collecting digital videotape to conduct research, define preservation workflows, establish standards, and develop the most impactful, preservation-efficient, and user-friendly tools for capturing content from these digital videotape formats.

The *Digital Video Commander* project seeks to reframe the entire paradigm of preservation when applied to digital videotapes rather than adopt upon the practices used for analog videotape. Capturing the contents of a digital videotape does not need to be as restrained as attempting to record an ideal, singular presentation of a videotape, but there is a potential that such effort could mimic the more accurate data transfers of hard drives or sectored optical discs where the quality of the data transferred could be verified piece-by-piece and retried as needed to create a more accurate result.

During the NEH R&D funded project, *DV Rescue*, MIPoPS has found that digitization software does not need to solely work as a diligent scribe that documents the contents recorded on legacy videotapes, but that such software can take control of the hardware, guide the user, automate actions, and orchestrate the entire reformatting event. Such an approach requires skilled development, but the results place this essential preservation practice within reach for more collecting institutions who would benefit from it while producing more accurate representations of digital videotape contents than is currently feasible with more traditional workflows. Additionally, whereas expert calibration of analog signals is essential for presenting data loss while digitizing analog videotapes, the opposite is somewhat true for digital videotapes, where signal manipulation of the digital videotape decoding adds generational loss rather than accuracy. We see that the characteristics of digital videotape provide an opportunity for automation, ease, and increased accuracy within the preservation of digital videotapes and the potential to promote project results in a way that reduces barriers for institutions seeking to establish in-house audiovisual preservation services.

We seek support from the National Endowment for the Humanities in order to generate, document, and disseminate these new tools, which will benefit the entire audiovisual preservation field, and in turn, benefit all areas of the humanities that relied on digital videotape as a form of source material and documentation, therefore saving valuable historic content from extinction.

1. SIGNIFICANCE TO THE HUMANITIES

The State of Digital Videotape Preservation
The introduction of digital videotape greatly simplified and diversified the use of video to educate, document, and create. The ease-of-use, affordability, and compactness of digital videotape enabled many heritage, journalism, and arts communities to integrate video into their culturally significant work. Digital videotape was introduced in the mid-1980s, replaced analog videotape in the 1990s, and remained in use through the late-2000s when it was then superseded by digital file-based video recordings. Preservation communities have developed expertise, tools, and best practices for both analog videotape and digital file-based audiovisual data; however digital videotape, which is data stored on a magnetic tape as a stream rather than as a file on a hard drive, falls in between these eras and the preservation of digital videotape has substantially less expertise, tools, or best practices to support its unique preservation. This project intends to

provide the research and development opportunity to give digital videotape a thorough re-examination for its own preservation strategy and tools.

In the course of our preliminary research, we wanted to discover and quantify how significant digital videotape was in the context of the audiovisual collections of national humanities organizations. We discussed the state of digital videotape preservation with George Blood who manages a large audiovisual preservation company. George said to us that, "the overwhelming majority of our work is for cultural heritage: libraries, archives, museums, governments, documentary producers, etc. By volume, we don't do much commercial, broadcast, or sports work." As his company aligns well with the organizations that we aspire to serve through this project, we were interested in what statistics he could offer in regards to the needs for digital videotape preservation and data he provided demonstrated about one-quarter of his company's videotape digitization focused on digital videotape. Additionally, his statistics show that digital videotape has annually increased as a percentage of videotape preservation services that his company provides. This trend appears to be true across videotape preservation services and we consider that it is very timely to commence a project, such as this, to comprehensively delve into the needed research, planning, tool-development, and consensus-building for a focus on the preservation of digital videotape.

Digital Videotape, Preservation Misfit

Sony D1 digital videotape was introduced in 1986, D3 videotape in 1991, Digital Betacam in 1993, miniDV in 1995, Betacam SX and DVCam in 1996, HDCam in 1997, D-VHS in 1998, Betacam IMX in 2001, HDV and HDCam SR in 2003. This list is a sampling of digital videotape formats spanning nearly two decades of technological development. As video production historically became more accessible many of these digital formats were the initial format used by humanities organizations to audio-visually document their work and educate their communities. These formats offered quality at a lower cost, democratizing the use of videotape recording, which empowered a diverse range of artists, journalists, and filmmakers to produce their own work.

The era of digital videotape gradually overtook the era of analog videotape for video production until the use of digital files made all forms of videotape obsolete. The preservation practices for digital videotapes have fallen into the cracks between those of analog videotapes and digital audiovisual files. The current state of archival preservation practices for digital videotapes has essentially become an adoption of the preservation practices for analog videotapes. These practices are built upon decades of trial and error, collaboration with related fields, and community consensus building; however, there are several reasons why the preservation practices for digital videotape should be separated from those of analog videotapes and be independently cultivated through research, development, outreach, advocacy, and broad application.

The good news is that the preservation practices for digital videotape can be far simpler and more accessible than those for analog videotapes. The digitization of analog videotapes requires expert calibration of audio and video signal characteristics such as color, brightness, and volume. Miscalibrating such signals risks loss of information, such as when details are lost in shadows or highlights when a signal is set too light[1] or too dark[2], or when color is misaligned and people appear too green[3] or red, or when audio details are lost in a crush of distortion when the volume is set too high or too low. The related projects, QCTools[4] and A/V Artifact Atlas[5], have provided tools to assess the digitization of analog videotape so the loss of details due to miscalibration or playback error can be more readily found and potentially remedied. These tools have subsequently provided archivists with the opportunity to develop a deeper understanding of the intricacies involved in the communication between audio and video signal and the equipment, therefore making the work more intuitive and resulting in higher quality results.

Digital videotape deserves and requires a fundamentally different approach. Whereas the manipulation of the signals from a played analog videotape is essential prior to digitization to ensure that the resulting digital file

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[1] https://bavc github io/avaa/artifacts/high_video_level html
[2] https://bavc github io/avaa/artifacts/crushed_setup html
[3] https://bavc github io/avaa/artifacts/subcarrier_phase_error html
[4] https://www bavc org/preserve-media/preservation-tools/qctools
[5] https://bavc github io/avaa/about html

represents the full quality and potential of the videotape, such manipulation is detrimental to playing back digital videotape since it is already digital. Adjusting the brightness, color, or volume of a digital videotape may still be helpful; however, such adjustments could be more easily applied to a resulting digital file, whereas not calibrating an analog videotape could result in irrevocable loss.

Our research within the *DV Rescue* project has shown us that the opportunities to preserve DV tapes more accurately by developing software that works with the videotape player to gather the more accurate and complete representation of the DV tape's contents. By applying a similar process as sector-based disc migration, we believe we'll be able to capture a more complete file from digital videotapes. As indicated by the name, this process operates by copying the source file, sector by sector, rescanning if it encounters an error. Rather than simply recording a file of what a video player is presenting, the recording software coordinates the entire process by assessing the data continuously, controlling the player to make second attempts as needed or guiding the user through easy-to-follow corrective actions. This proposal extends these findings from DV to all digital videotape formats.

More Humanities Organizations Digitizing More Videotape

We've found that many collecting institutions are well-aware of the obsolescence issues facing videotape formats, but are hesitant to establish their own digitization stations and workflows because of the required expertise, hardware, and guidance. Much of this perceived complexity is associated with the digitization of analog videotape, which requires playback decks, tools to aid signal calibration such as waveform monitors, vectorscopes, and VU meters, corrective tools such a process amplifiers, black burst generators, and timebase correctors, as well as hardware to support signal conversion in order to get the analog signal into a computer's digitization card.

Our recommended approach for digital videotape formats is far simpler: a digital videotape player connected by an SDI cable directly to a computer's digitization card and a control cable from the computer back to the videotape player so that the software can send commands to the player. The deliverables of this project would provide shopping lists, training materials, instructional videos, and software that collecting institutions could use to establish their first videotape preservation stations that focus on transferring their digital videotape formats. We believe that the simplicity and opportunities for our proposed software to coordinate the preservation of digital videotape, will provide a very accessible stepping stone for collecting institutions to start digitizing videotapes by focusing on digital formats. From here, we imagine with the gained experience that many institutions would be soon able to expand their expertise and equipment to tackle the complexities and urgency of analog videotape digitization.

This is made even more significant with the past common practice of preserving film on Digital Betacam. Many institutions created preservation copies from their film collections on DigiBeta throughout the early 2000s and while they might still have both the film and video copies in their holdings, there are some significant reasons that it may be better to create in-house digital access of the Digital Betacam materials. It is cheaper to do this work in-house rather than scan the film, especially for organizations that do not have the ability to digitize film in house. This reduces vendor costs, the overall financial burden, and work time, especially if using the new techniques and technologies proposed within this grant. Furthermore, sometimes organizations are not able to afford a freezer or climate control storage for film, causing deterioration that results in an image that is lower quality than when it was transferred to Digital Betacam.

Significance of Historical Content

For this project, MIPoPS and RiceCapades will continue our partnerships with institutions that have digital videotape holdings of significant historical value and perform preservation and digitization of their videotape holdings on-site. Under MIPoPS' guidance, these groups will function as a test group for the *Digital Videotape Commander* program. Currently, eight organizations have committed to participating, but we will actively seek out additional partners throughout the project. The institutions selected for participation initially will include:

Carnegie Hall Archives (New York, NY): In 2012, CH Archives began a multi-year initiative to preserve and digitize most of the Hall's historic collections. Hundreds of thousands of analog materials have been digitized, but the Archives has born-digital materials, including digital video, that need attention so its content and context can persist for use by staff and researchers. CH Archives inherits materials produced by different departments throughout the organization, including media and web content teams who produced materials on MiniDV and other digital video formats in the 1990s-2010s. For example, CH Archives has a small collection of DV tapes containing raw artist interview files related to festival and anniversary programming which have not been accessed since they were last edited to create downstream public versions.

The *Digital Video Commander* project's upcoming focus on outreach will aid institutions like CH that do not currently have in-house digitization procedures and empower them to digitize more efficiently and effectively. By continuing to participate in the *DV Rescue* Project and looking onward to expanding the scope within the *Digital Video Commander* project, CH Archives will unlock the valuable content on this media and support the cultural heritage community by sharing their work and supporting the development of shared toolsets. If any of the content of the tapes is appropriate for broad release, it could become part of the Carnegie Hall Digital Collections Preview - currently enabling public access to nearly 85k historic items for search, browse, and download.

Democracy Now! (Washington, D.C.): The DN! collections are home to thousands of raw MiniDV recordings dating back to 2001. Selections of this format have been transferred to DV-encoded files. However, many still require digitization and are of the highest preservation priority. Reports performed on many DV file holdings have shown several critical errors within the files such as timecode breaks and other artifacts. *Digital Video Commander* would provide the ability to recapture and access a broader range of digital videotapes that are currently inaccessible and make up 90% of DN!'s moving image collection.

Mid-Atlantic Regional Moving Image Archive (Baltimore, MD): MARMIA is a nonprofit organization dedicated to the preservation and access of movies and sounds that document the arts, history, and culture of the U.S. Mid-Atlantic region. Their collections contain an increasing amount of digital videotapes. MARMIA also offers discounted audiovisual digitization services to organizations and individuals in the Mid-Atlantic region. MARMIA performs these services for those who do not have the time, equipment, or expertise. They also encourage and teach others to perform this process. Tools that work to provide access to digital formats on physical carriers are a crucial need for recent Mid-Atlantic regional history.

New York Public Library (New York, NY): A wide-scale survey of their collections, conducted by Audiovisual Preservation Solutions (AVP) in 2012, revealed that NYPL holds more than 5,000 Digital Betacam, Betacam SX, MPEG IMX, HDCAM/HDCAM, SR, and MicroMV tapes, and NYPL's new acquisitions continue to grow. The survey highlighted the problematic nature of these digital video formats and recommended prioritizing specific collections due to their cultural and historical significance. Until tools such as those outlined in this proposal are available, these collections are unavailable to researchers. Of the cataloged holdings at NYPL, the following archival research collections contain digital videotape formats:

AIDS Activist Videotape Collection	Michael Hollman Collection	Howard Dodson Papers
Gay Men's Health Crisis records	Rise and Fall of Jim Crow	Nancy Meehan Papers
Joffrey Ballet Company Records	Marjorie Gamso Collection	Alvin Lucier Papers
Joffrey Ballet Company Records	Rise and Fall of Jim Crow	Maya Angelou Papers
Cataloged Dance Original Media	Artkraft Strauss records	Nancy Meehan Papers
Rose Leiman Goldemberg Papers	Elizabeth Swados Papers	Sally Gross Papers
Saeko lchinohe Dance Company	Symphony Space Records	Mikel Rouse Papers
James Wentzy Papers (ACT UP)	William Greaves Papers	Mikel Rouse Papers
Cynthia Newport Dance Cuba	Mr. Freeze Collection	Merce Cunningham
	Meredith Monk Archive	Florence Rice

Seattle Municipal Archives (Seattle, WA): Many of the moving image collections at SMA contain DV. In particular, the Seattle Channel Moving Image Collection and Seattle City Light Moving Image

Collection contain thousands of tapes of original footage and final projects shot on Betacam SX, Digital Betacam, DVCPro, DV, and MiniDV. Seattle Channel programming narrates the political, social, and cultural fabric of Seattle's history in the last thirty years, a period of intense change, both in terms of infrastructure and the built environment and its social landscape. Program topics include transportation, housing, arts, social justice, environmental issues, and public safety. The Seattle Channel collections also provide insight into the history of public access television. Public affairs programs with mayors and city council members include critical topics such as immigration, minimum wage, the all-ages dance ordinance, and transportation planning. *City Inside/Out* focuses on more controversial topics such as police accountability and public safety, race relations, and homelessness. *Art Zone* includes interviews with local artists ranging from high school bands to Seattle Art Museum artists and a monthly series of interviews with political and cultural leaders. Two shows focus on neighborhoods incorporating interviews demonstrating the diversity within and between neighborhoods and highlight community voices. The show *Book Lust* started as *Book Talk* with action figure librarian Nancy Pearl (known as "America's favorite librarian"); it includes interviews with authors, including Ann Patchett, Susan Rich, and Maria Doria Russell. Seattle Channel also created documentaries on environmental, political, and cultural issues such as preserving Seattle's creeks, homelessness, local Native American leader Bernie Whitebear, and artists. Using the facilities and digitization workflow established at MIPoPS, SMA previously was using Live Capture Plus to transfer DV, but that process is now suffering from lack of reliable capture software, with hundreds of tapes yet to be transferred. Since the start of the *DV Rescue* Project, SMA has been able to preserve # of DV videotapes. Many of SMA's film preservation copies remain on Digital Betacam and transferring this content is more sustainable (SMA cannot currently digitize film in-house and does not have funding for vendor services) and provides a better quality copy since most of the film has advanced stages of vinegar syndrome at this point. Digital Video Commander will ensure that SMA is able to capture the best possible quality efficiently and effectively.

Smithsonian – National Museum of African American History & Culture (Washington, D.C.):
NMMHC hosts the Robert F. Smith Fund initiative The Great Migration, a project to build a collection of home movies relating to the African American experience and making them publicly accessible by welcoming patrons to bring in home movie footage for free, professional digitization. MiniDV is a common format brought in that people have used to capture their daily lives in the 20th century and can often be one of the most problematic for creating a preservation level copy. Additionally, NMMHC has a growing collection of MiniDV tapes and other DV formats, as well as a variety of digital videotape formats that the museum acquires as part of collections brought in by curators. The *DV Rescue* project has been a most welcome tool to ensure proper transfer of the contents of the MiniDV tapes and assists in saving these unique experiences of African American life that may have otherwise been lost forever.

UCLA Library Preservation Program (Los Angeles, CA): UCLA Library and its affiliates have a number of digital videotape formats in its collections which could certainly benefit from the *Digital Video Command* project. Three collections of note include:

- Eika lshioka Papers: the Japanese art director, costume designer, and graphic designer. lshioka documented her creative process and research on a variety of video and audio formats throughout her career, including MiniDV.

- Freedom Park: As part of its work on the International Digital Ephemera Project (IDEP) UCLA Preservation has been conducting outreach efforts to train partner institutions to digitize their collections. One of our partners, Freedom Park in South Africa has a large collection of oral histories on MiniDV conducted with anti-apartheid activists.

- UCLA's Chicano Studies Research Center (CSRC): Founded in 1969, CRSC has been collecting content to support the scholarly research of the Chicano-Latino community. The Center has nearly 200 oral histories and cultural events captured on MiniDV.

Additionally, the UCLA Library Preservation Program supports preservation and access to moving images and recorded sounds held in UCLA collections, including a variety of analog and digital videotape formats, by providing digitization services.

University of Washington Libraries (Seattle, WA): The University of Washington Libraries house the largest archival audiovisual collections in the State of Washington. These collections include materials from University Special Collections, University Archives, and the Ethnomusicology Archive that in totality represent a resource of regional, national and international importance. Amongst these collections are a variety of digital video formats, including components of the following notable collections:

- The Adrian Cowell Films and Research Collection: This collection is composed of raw production materials created by Adrian Cowell, primarily from his documentary work covering the drug trade and insurgency movements within the Shan State of Myanmar. The Shan State was virtually closed off to the outside world in the late 1950 to early 1960s, in part due to conflict. The Adrian Cowell Film and Research Collection is the most extensive collection of images and footage of the Shan State in the world and is a priceless ethnographic resource.

- KIRO TV News and Programming Collection: This collection includes news, sports, and special programming broadcast materials from KIRO TV, the CBS affiliate for the Seattle area. Contents span decades of materials and are a critical resource for local history.

- Robert Garfias Recordings: Robert Garfias, the founder of the Ethnomusicology program at the University of Washington filmed countless hours of performances. These materials represent countless cultures and traditions that span the globe, including American blues, traditional Korean Kayagum performances, and drumming from Northern India.

2. PRESERVATION AND ACCESS RESEARCH IMPACT

Digital Video Commander is intentionally designed to address the obsolescence, risks, and weaknesses of a particular family of formats (digital videotapes). Thus, our intended audience is ultimately any organization or individual that cares for content stored on digital videotapes. Our preliminary research and surveying of project partners have found that digital videotapes average about 25% of the videotape materials in institutions such as independent media organizations, theater groups, dance companies, performance spaces, scientific studies, academic departments, research institutes, public access journalism stations, and community organizations. Although this project's work plan is quite technical, we believe that the functionalities of digital videotape can be used to allow *Digital Video Commander* to guide all sorts of users through the process of setup, transfer, and preservation so that the deliverables will be very easy-to-use without requiring any comprehensive technical expertise in the format or prior experience in data migration.

From reviewing listservs and forums of audiovisual archivist communities we can see clearly that the reformatting of digital videotape is an increasing struggle and the outcomes of this project would be readily used and widely appreciated. In engaging with preservation communities to produce the underlying research for this application, we have heard repeatedly that this is a much needed and urgent project.

Our approach to software development shall enable any audience to participate, contribute, and benefit from the process. All documentation and software shall be made available under an open and permissive license, contributions shall be guided by a welcoming contribution policy and code of conduct.

Alongside the development work in a GitHub repository, we anticipate generating engaging and helpful documentation, video demonstrations, sample file libraries, and how-to documentation to enable users to jump in, ask questions in a safe environment, and take advantage of the project. Our audience will have many opportunities to engage with project leaders through GitHub forums, project wikis, forums, and comment sections, or direct contact. As demonstrated in our past projects, our team members strive to

support skill-sharing, community empowerment, open development, and a transparent development process.

Digital Video Commander will provide new opportunities in videotape reformatting such as selective retransfer, responsive real-time analysis, and automated user-guidance. The patterns and behavior of digital videotapes are different worlds compared to their analog counterparts and offer possibilities for automation and ease-of-use that have not yet been uncovered or taken advantage of. The resulting digital files from use of the *Digital Video Commander* software should not only serve to preserve the audiovisual data of the digital videotape as effectively as possible, but will also facilitate re-use of digital videotape's rich metadata by adding navigation, indexing, and cataloging features to create a more intuitive approach to preserving and using data.

3. PROJECT HISTORY, SCOPE AND DURATION

Preliminary Research

The development planning of this project builds upon research and experience conducted by the participants of the *DV Rescue* project, including members of MIPoPS, RiceCapades, MediaArea, and our partnering institutions. This group collectively provides an enormous wealth of relevant experience from managing large-scale reformatting of digital videotape, the development and application of software from the NEH-funded QCTools project, and community development of the open-source audiovisual digitization software, vrecord.

Although QCTools was initially developed to evaluate and respond to the digitization of analog videotape, the software has certainly been well-applied to the resulting files from digitizing digital videotape. This experimentation and gathered data have presented our team with an outline of how digital videotape transfers can fail, what can go wrong in a transfer and how to detect it, and what sorts of errors can be improved upon and how.

The development manager for this project, Dave Rice has a long history of research and development work with digital videotape formats. From 2004 through 2008 Dave served as the archivist for Democracy Now, whose video collections include over 50,000 digital videotapes. In 2009, Dave was hired as a consultant by the International Criminal Tribunal for Rwanda, which managed 45,000 hours of courtroom recordings on digital videotape, in order to research and design preservation strategies. While working on QCTools, MediaConch, and vrecord, Dave and Jérôme found several opportunities where the aspects of these independent tools could be combined and built upon in order to realize a project such as *DV Rescue* to facilitate capturing, assessing, displaying, and packaging DV for preservation. Dave also contributed testing and feedback to the DV decoder in FFmpeg[6]'s libavcodec library and to the iec61883 and AVFoundation support in FFmpeg's libavdevice library. In 2015 the International Association of Sound and Audiovisual Archives (IASA) journal published "Digitization Software Obsolescence, Too?"[7], an article by Dave detailing the obsolescence issues surrounding software that helps transfer content from videotape, with a focus on DV. Key discoveries and results from the *DV Rescue* project revealed to us the opportunity to expand these concepts to other digital videotape formats and, with the feedback and support from our project partners, we developed this proposal for *Digital Video Commander*.

Project Setting

For MIPoPS, the conviction that the magnetic media crisis can be better met with pooled resources, rather than by each institution navigating these waters solo, was supported from 2015-2018 by two grants from 4Culture.[8] These initial/early grants enabled MIPoPS to build a foundation for ongoing relationships with King County heritage organizations, provided an opportunity to develop technical documentation, and supported the creation of a sustainable model for MIPoPS to train staff and volunteers from heritage organizations to perform preservation work on videotapes in their collections. MIPoPS has also been able

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[6] https://www.ffmpeg org
[7] http://dericed com/papers/digitization-software-obsolescence-too/
[8] 4Culture is the cultural services agency for King County, Washington MIPoPS received funding from the Collection Care program for two projects: "MIPoPS King County Pilot Project" (2015) and "One Tape at a Time: Unearthing the Moving Image Record of King County" (2016)

to apply its working model on a larger scale with grants received by the National Endowment for the Humanities (NEH)[9] in 2017 and the National Historical Publications and Records Commission (NHPRC).

MIPoPS is located in the Seattle Municipal Archives at Seattle City Hall. MIPoPS and SMA have a partnership that allows MIPoPS to occupy space at SMA's facilities and SMA to use MIPoPS's equipment at no cost to either party. In this way, MIPoPS has a donated space at City Hall and the Seattle Municipal Archives has access to legacy video players, capture software and expertise in a mutually beneficial arrangement. The MIPoPS office at SMA includes many digital video and DV decks to accommodate a wide range of associated formats[10].

Test Group
The institutions selected for participation initially will include[11]:

- Carnegie Hall Archives (New York, NY)
- Democracy Now! (Washington, D.C.)
- Mid-Atlantic Regional Moving Image Archive (Baltimore, MD)
- New York Public Library (New York, NY)
- Northeast Document Conservation Center (Boston, MA)
- Seattle Municipal Archives (Seattle, WA)
- Smithsonian – National Museum of African American History & Culture (Washington, D.C.)
- UCLA Library Preservation Program (Los Angeles, CA)
- University of Washington Libraries (Seattle, WA)

4. METHODOLOGY

Developmental or Experimental Methodology
An established best practice in digital preservation is that content must be migrated from formats facing obsolescence, deterioration, or risk to an alternative format more suited for long-term preservation. Fulfilling this practice for digital videotape is challenged as current practices are essentially an adoption of practices that have been developed specifically for analog videotape. With our team's experience in the development of projects such as QCTools, *DV Rescue*, and vrecord, we believe that it's time to reevaluate and reimagine the entire paradigm for the transfer of content from digital videotapes for preservation. These objectives require a series of experiments into the behavior of digital videotape and responsive development of software. We plan to join the outcomes of that research with responsiveness to community testing and experience to guide the development of the project deliverables.

Our team will develop tools for the *Digital Video Commander* project in C++, which permits use on major operating systems and software distribution methods (Mac App Store, homebrew, et al), provides native access to a computer's file API, and addresses the requirement for fast input/output on many large and complex files. This approach builds upon our developers' prior experiences used with QCTools, *DV Rescue*, and MediaConch. For a graphical user interface framework, the developers will use Qt, an open-source and cross-platform application framework and widget toolkit designed for creating graphical user interfaces. C++ and Qt are widely-supported, sustainable languages, and frameworks that support an open-source, cross-platform approach.

As with the *DV Rescue*[12] and QCTools[13] projects, our development environment will stay in GitHub. We've found GitHub to be an excellent online environment to engage with new user communities, gather fast and responsive feedback, and to allow anyone interested to see our work as it progresses. To draw attention to our development, we shall continue to publish blog posts that document our own learned processes and

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[9] Award PW-253708-17 for the "Magnetic Media in the Pacific Northwest: Saving our Visual Media" project
[10] MIPoPS' deck inventory (b) (4)
[11] For details on these partner institutions' missions and backgrounds, please see Documentation attachment
[12] https://github.com/MIPoPS/dvrescue
[13] https://github.com/bavc/qctools

experimentation, make our development work more understandable, and other means to facilitate broad outreach for our work.

To address capturing audiovisual data from tape for processing by *Digital Video Commander*, we will build upon FFmpeg's resources for audiovisual processing, MediaInfoLib for bitstream analysis, and standards such as RS-422 and SONY 9 pin protocol to support communication and data transfer between *Digital Video Commander* and the digital videotape players. To support standards-based analysis of incoming digital videotape frames, we plan to extend FFmpeg's libavfilter library to provide comprehensive logging and heuristics to provide real-time assessment of digital videotape transfers. In order to show how flaws in the digital videotape transfer process impact the audiovisual presentation, we plan to expand FFmpeg's libavfilter library so that *Digital Video Commander* can 'show' the user exactly how transfer compromises have impacted the results.

In several places, we plan to build upon, contribute to, and integrate existing open-source resources for specific roles within *Digital Video Commander*. This keeps the overall approach more sustainable and increases impact. These contributions also provide an opportunity for our developers to have their work peer-reviewed by fellow multimedia experts and ensure that our work meets community standards and users' needs.

To support the reporting of *Digital Video Commander* events, the analysis of digital videotape captures, the impact of multi-pass restoration efforts, and overall metadata and statistics, we will extend the XML format and schema that we defined within the *DV Rescue* project to cover other forms of digital videotape transfer metadata. *Digital Video Commander* will use this XML to produce various user reports in formats such as HTML and plain text.

Our methodology balances several core tenets held by our team:

- A meticulous and reasoned interpretation of standards documentation that draws out meaning from implicit to absolute.
- A careful and methodical approach with the design of any procedure that includes the manipulation of preservation objects (whether physical videotape under the control of software or the resulting digital files).
- An understanding that constructing tools for digital archiving must be designed in a manner that is efficient to scale.
- A commitment to undertaking development in public spaces that supports and welcomes commenting, contribution, onlooking, and auditing.
- Constructing applications should not only serve the developers direct objectives but may also serve as building blocks for future potential development within the community.
- Archivists should actively collaborate with developers and specification authors in order to ensure that the tools and solutions for preservation challenges are envisioned and are built responsively to archival needs.

In order to facilitate a fast and efficient exchange of feedback and development, between the developers and users, we will institute automatic daily builds that will create minor release versions of *DV Rescue* whenever the source code is changed. This allows for users to have easy access to snapshots of the development work and allows the developers to have a means to quickly deliver versions of *DV Rescue* that react to or resolve any user feedback. Daily builds will be built for multiple operating systems at once, including for Windows, macOS, and various common Linux systems[14]. Daily builds will be available to the public via GitHub so that any onlooker or user may review our work in progress and comment upon it.

Our team shall conduct user testing to gather feedback and impressions, as well as and discover issues and enhancement opportunities. Rather than simply gathering feedback on a single initial release for

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[14] For reference, RiceCapades and MediaArea already provide daily builds for several open source projects, including BWF MetaEdit, AVI MetaEdit, MediaInfo, MediaConch, QCTools, at this URL (b) (4) ▓▓▓▓▓▓▓▓▓▓▓

consideration towards a final release, we anticipate making substantial use of our daily builds and minor releases during engagements and dialogue in user testing. We want users to quickly see their feedback or discoveries impacting the development of *DV Rescue* in order to verify well the resolutions of issues. Additionally, we will encourage, where feasible, for user feedback to occur in collaborative online spaces so that others may engage and build upon such feedback.

We are excited about the opportunities to gather information on digital videotape implementations, engage with users about their experiences with and implementation of *DV Rescue* and *Digital Video Commander*, and discover opportunities for strengthening how both tools can address its objectives. We plan for a phase of *Digital Video Commander* to be an engaging period of experimentation, ongoing dialogue, and findings. Our team shall publish a summary of the testing outcomes in a report while also using this time to invest in engagement with users and expanding the communities in online project spaces such as GitHub and via direct communications with users. We plan to engage actively with at least nine partnering institutions and plan to foster and engage a wider community as well.

Collections Handling

Given that the software developed within the *Digital Video Commander* project is to be used with preservation objects such as potentially unique digital videotape, we will strive to meticulously ensure that risk is addressed and controlled throughout the development via rigorous testing of a control set of videotapes at MIPoPS. As software is evaluated for risk, so are all analog, digital, and DV videotapes throughout the digitization process. MIPoPS provides their partners with strict guidance on the inspection[15] and handling of all video materials. This includes proper storage, damage, and contamination inspection (including proper baking technique[16] if needed), tape repair, repacking tapes, and preparation for and use of playback[17], and appraisal.

Data Capture

As known through our team's experience within the *DV Rescue* and QCTools projects, the efficient feedback of the user community is pertinent to responsive, comprehensive development. Thus software designed within this project will produce verbose logs of settings, actions, and environments so that errors or issues may be reported along with sufficient documentation of the user of the software that our development team can use to diagnose and/or recreate issues. For testing of the software in between releases as it develops, MIPoPS will maintain spreadsheets that summarize the statistics and outcomes of reformatting transfers for various formats of digital videotapes.

Intellectual Property and Privacy

The *Digital Video Commander* project plan relies substantially (and intentionally so) on open-source software. Foundational tools such as FFmpeg, *DV Rescue*, vrecord, QCTools, and others provide us with the intellectual property that we and our users need to contribute to and sustain the project. Even in the *DV Rescue* project, for advanced technological challenges, such as developing a sustainable method to communicate control commands from a modern computer to a legacy DV video player, we strove to and succeeded at generating solutions that could be shared under open licenses. Our team does not underestimate the significance and value of open source software and documentation in facilitating preservation capabilities that are sustainable. To the greatest extent possible, we wish to provide guidance, tools, and capabilities to the communities that we serve that do not lock or beholden them to any particular intellectual property.

Of course, our project does involve a hardware component where the transfer of digital videotapes will require proprietary videotape players and cabling. For this, we will provide users with guidance and advice on what hardware to acquire, focus on recommending what is readily available, and seeking to reduce the amount of obsolete or proprietary hardware to the minimal list.

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[15] Videotape Identification and Assessment Guide: (b) (4)
[16] MIPoPS Manual section on baking: (b) (4)
[17] MIPoPS Manual section on preparing for capture (b) (4)

In order to complete research into the behavior of digital videotapes that may be compromised or damaged, we will generate a library of digital videotapes of a variety of formats in order to create ideal transfers and then, after applying controlled damage to the tape, compromised transfers. These before-and-after audiovisual recordings will be an important resource for educating about the value of having a responsive, coordinating software to transfer digital videotape and provide foundational data to use to plan out methods for diagnosing and (where possible) recovering mis-transferred data. So that such data can be readily-shared publicly, this library of digital videotape recordings shall be produced from public domain content or content that we create and then openly license. This approach is significant to overcoming the issue where partnering institutions want to share relevant examples of transfer errors but are unable to do so because such content depicts restricted intellectual property.

6. INSTITUTIONAL PROFILE AND PROJECT STAFF

About MIPoPS

Moving Image Preservation of Puget Sound (MIPoPS) was formed to help preserve audiovisual heritage in the Pacific Northwest by assisting heritage organizations with the conversion of video recordings to digital formats according to archival best practices. The consortium was founded by Rachel Price, Executive Director[18]; Anne Frantilla, City Archivist at Seattle Municipal Archives (SMA)[19]; Hannah Palin, Film Curator at the University of Washington Libraries, Special Collections (UWSC)[20]; and Carol Shenk, King County Archivist at King County Archives (KCA)[21]. After three years of planning, MIPoPS received its 501(c)(3) status in 2015. MIPoPS supports videotape digitization and preservation by heritage organizations with analog video in their collections but with neither the resources nor expertise to address these at-risk materials. MIPoPS can work with a variety of videotape formats including 3⁄4" U-matic, VHS, Betacam (SP, SX, and Digital), LaserDisc, Hi8, D-2, 1-inch, and DV (including DVCAM, DVCPro, DVCPro50, HDV and MiniDV).

Over the past three years, MIPoPS has worked with 25 participating institutions (PIs) to train and assist them in the digitization of their magnetic media, including the Museum of History and Industry; Scarecrow Video; Seattle Art Museum; Southwest Seattle Historical Society/Log House Museum; University of Washington Libraries; and the Wing Luke Museum. This resulted in the preservation of 2,521 videotapes to date (over 1,800 hours of content) and creating access to 1,675 video recordings of freely accessible content on the [MIPoPS Internet Archive collection](https://archive.org/details/mipops)[22], notably rare oral histories of the region's arts, business, activist and scholarly communities, rare films that never made it to digital formats, mime theater films, and local documentaries.

Throughout these projects, MIPoPS has discovered the importance of working with participating institution representatives (PIRs) on an individual level. For each PIR, we follow a similar initial assessment:
- Identify institution-level expectations and needs (technology restrictions, the environment where the analog tapes have been stored, platform/server on which their files would be housed, and concept level of file formats, such as preservation vs. access) coupled with our suggestions for best practices.
- Establish an individual workflow for appraisal, selection, and digitizing based on resources available at the institution and status of appraisal previously completed.
- Provide structure and guidance for tape selection. Since these groups are not able to digitize their material in-house, this often means that they have not had much experience working with videotape or the ability (equipment) to review the content. Often tapes do not have accurate or useful information written on the labels which makes a minimal scan of the content essential. Just as with other archival materials, there are many factors to weigh and unique ones to consider during appraisal.

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[18] Rachel Price has a degree in Moving Image Archives studies from University of California, Los Angeles and has been managing film and videotape projects at the Seattle Municipal Archives for over a decade
[19] Anne Frantilla has been with the City of Seattle for 20 years and has been instrumental in spearheading a moving image preservation program at the Seattle Municipal Archives, making these materials accessible for the first time through online resources
[20] Hannah Palin has been managing grant-funded moving image preservation projects at the University of Washington for almost 17 years, including the Washington Film Preservation Project, a collaborative effort to preserve and make accessible films from nine regional institutions
[21] Carol Shenk served as Information Manager at the Seattle Municipal Archives for seven years and has extensive experience with digital asset preservation programs
[22] https://archive.org/details/mipops

- Once the PIRs' needs and expectations are established and a preliminary workflow is in place, training becomes more technical. Depending on whether or not the institution has access to the required player(s) and can view tapes on their own, we either schedule our next meeting for appraisal or digitizing. At least a portion of appraisal usually takes place at MIPoPS to allow the PIR(s) to review quality and content while being able to ask questions and have support if equipment or tape issues arise. MIPoPS provides training on inspection and tape handling best practices.
- Once the PIR has completed appraisal, digitizing begins. In order to ensure that PIRs don't get overwhelmed, discouraged, or frustrated, information is delivered in multiple efficient ways to accommodate all learning styles.
- Once a PIR has completed the process, we gather and analyze feedback about their experience and use it to restructure procedures and improve our process.
- MIPoPS does not handle any of the internal cataloging, indexing, or describing related to the materials. The PIRs provide their preferred metadata for each item, to ensure that the information we provide on the Internet Archive for each video is consistent with their cataloging record. We actively advocate to the Internet Archive regularly to continue our ability to create subcollections for each participating institution regardless of collection size in order to maintain the integrity of this metadata and its consistency from each institution's established standards.
- Based on need, MIPoPS provides long term LTO storage to institutions without the infrastructure to support the large files created from videotape capture. Alternatively, for those PIs with the ability to securely store their video content, MIPoPS provides guidance on best practices and strategies to care for and maintain the integrity of their files[23].

MIPoPS actively works to encourage and provide extensive training to its participating institutions in the use of open source technology for preservation. By contributing to open capture software, such as vrecord and QCTools, and collaborating with other contributors to modifying certain aspects of the interface to make it more user-friendly to archivists less versed in coding, MIPoPS was able to make their PIRs feel confident and comfortable using these tools which have resulted in successful adoption at partnering institutions.

MIPoPS is poised to begin work by applying new methods for capturing digital videotapes included in several location partner collections. Not only are these collections at risk because of the current lack of reliable capture software, but they stand a chance of not properly being preserved.MIPoPS is committed to preserving the visual history of the Pacific Northwest through digitization of videotape, as well as raising awareness about the magnetic media crisis among heritage institutions. The preservation of digital videotape is a plight across communities because of the unique capture requirements, preservation issues, and lack of current reliable software. As the main applicant, MIPoPS[24] will serve as the caretaker for the *Digital Video Commander* project, monitoring the activities performed by all parties to ensure the project work is completed on schedule. MIPoPS has extensive experience with managing grants, all of which have been collaborative projects with local archives, libraries, museums, and heritage institutions. They are dedicated to continuously improving their workflows and methods.

Rachel Price, Project Director: Rachel Price will serve as Project Director. In this role, she will oversee the administration of grant funds, manage the budget and payroll. In conjunction with the MIPoPS Board, she will be responsible for MIPoPS' strategic plan, and fundraising. She will remain in regular contact with RiceCapades and MediaArea (as well as MIPoPS staff) with any financial and schedule updates or modifications throughout the project to maintain progress transparency and ensure that the work is completed on time and within budget. She will gather reporting information from all partners and submit reports to NEH.

Rachel Price has a Master's degree in Moving Image Archive Studies from UCLA. She has held various

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[23] International Association of Sound and Audiovisual Archives (IASA) *Handling and Storage of Audio and Video Carriers* https://www.iasa-web.org/handling-storage-tc05 & *Guidelines for the Preservation of Video Recordings* https://www.iasa-web.org/tc06/guidelines-preservation-video-recordings
[24] Resumes for all project staff are attached to this application; please see Resumes attachment

positions in radio broadcasting, media production, and archiving. She founded MIPoPS and has served as the Executive Director for the past four years. She has successfully served as Project Director on all previous MIPoPS grant projects (4Culture, NEH, NHPRC).

Libby Hopfauf, Project Manager: Libby Hopfauf will serve as the Project Manager for MIPoPS's participation in this project. She will establish and maintain regular communication with partnering institutions and organize outreach events. Hopfauf will oversee and contribute to feedback and data collection; documentation creation, publication and maintenance; participant testing, and designing and providing tutorials and technical support to partnering institutions. She will regularly communicate with the Development Manager and Project Director to share data, findings, and status reports throughout the project.

Hopfauf graduated from the University of Washington with a Master's in Library and Information Science and has previously worked with audiovisual materials at the University of Washington Libraries, Special Collections. For the past five and a half years, she has been working as an Audiovisual Archivist for SMA and MIPoPS. Hopfauf has served as the Project Manager on all MIPoPS grant projects (4Culture, NEH, NHPRC). As the Program Director/Audiovisual Archivist at MIPoPS, she has worked with over twenty-five heritage institutions in the process of digitizing their magnetic media. She created and maintains the participating institution and staff processing manuals, as well as the open-source workflow, tailoring the programs to be user-friendly to a variety of users with varying levels of technology skills. She provides training and onsite assistance to participating institution representatives, supervises digitization, plans and orchestrates outreach events, creates and maintains supplemental comprehensive documentation, and digitization workflow. Hopfauf is an active contributor to open tools and projects (specializing in documentation) such as QCTools, vrecord, and Puget Sound and Vision and is passionate about making them accessible to archivists with a range of technology experience and skills. She works with MIPoPS participating institutions to actively encourage the use of open-source tools and implementation of such at their own facilities.

Andrew Weaver, Technical Liaisons Consultant: Andrew Weaver will serve on an in-kind basis as the Technical Liaisons Consultant on this project. He will be responsible for ongoing technical and logistical support of core and partner organizations, particularly with regards to promoting collaboration via the Github project repository. Weaver will create Github tutorials and provide instruction and assistance to project partners to facilitate continuous participation as well as support MIPoPS staff with outreach and dissemination activities.

Weaver received an MLIS from the University of Washington Information School and specializes in audiovisual and digital preservation. He was a participant in the 2016-17 National Digital Stewardship Residency administered by the American Archive of Public Broadcasting and has served as the Digital Infrastructure and Preservation Librarian for Washington State University. Currently, Weaver is the Media Preservation Librarian at the University of Washington Libraries where he is responsible for coordinating and managing reformatting projects and conservation strategies for the Libraries' time-based media materials. He is an active contributor to several preservation-focused open source projects, including being a project maintainer for the FFmpeg based vecord reformatting tool. Through his work, he seeks to further harness and integrate the open-source ethic within archives via tools, education, and outreach.

As MIPoPS' Archivist at Large, Weaver provides ongoing in-kind consultation to MIPoPS to support their digital preservation workflows. This includes developing and maintaining MIPoP's Github based scripts for preservation package generation and file integrity verification. Additionally, he was responsible for the implementation of LTO based storage by designing workflows and creating/integrating open-source tools.

MIPoPS will continue to be supported by the members of their board and steering committee throughout the project on an in-kind basis:

MIPoPS Steering Committee

- Anne Frantilla (City Archivist, Seattle Municipal Archives)
- Hannah Palin (Film Curator, University of Washington Libraries, Special Collections)

MIPoPS Board
- Anna Briggs (External Project Evaluation Expert, the European Commission's Education, Audiovisual and Culture Executive Agency)
- Hannah Palin (Film Curator, University of Washington Libraries, Special Collections)

Development Team
MIPoPS will contract with RiceCapades which will act as the development team for this project. MIPoPS previously used Dave Rice as a consultant to design their original set-up for the digitization of analog videotape and currently collaborate with his team on the *DV Rescue* project.

Dave Rice, Development Manager: Dave Rice will serve as the manager of the development team. Dave is an audiovisual archivist and technologist whose work focuses on bringing together open source technology, audiovisual preservation, and standards development. Dave graduated from the L. Jeffrey Selznick School of Film Preservation and has worked as an archivist or archival consultant for City of the University of New York, Democracy Now!, United Nations, WITNESS, and Downtown Community Television. In 2016 Dave Rice was awarded the Alan Stark Award by the Associated of Moving Image Archivists for significant contributions to the work of moving image archives. He also received the Innovation Award from the National Digital Stewardship Alliance for his contributions regarding collaborations between audiovisual preservation and open standards communities.

Dave has custom-written applications for archival processing for the National Library of Norway, Bay Area Video Coalition, California Audiovisual Preservation Program, the Dance Heritage Coalition, and numerous other archives. As the software to facilitate the digitization of analog media is itself becoming obsolete, Dave has been leading efforts to build momentum and community within open source projects to facilitate the digitization of analog media. Previously Dave has successfully served as development manager for QCTools and *DV Rescue*, both NEH-funded projects, that designed open-source software to facilitate the assessment of the results of digitization of analog video. The NEH frequently uses QCTools as an example outcome of its Preservation and Access Research and Development grant. Dave also acted as Project Manager for MediaArea's efforts within the PREFORMA project, MediaConch, an extensible, open-source software project consisting of an implementation checker, policy checker, and fixer that targets preservation-level audiovisual files (specifically Matroska and FFV1).

Ashley Blewer, UX Specialist: Ashley, working as a subcontractor of RiceCapades, shall serve as UX Specialist for the *Digital Video Commander* team, ensuring cohesive and intuitive user experience for associated tools and educational materials. Ashley works at Artefactual Systems as their AV Preservation Specialist, primarily on the Archivematica project. She specializes in time-based media preservation, digital repository management, infrastructure/community building, computer-to-human interpretation, and teaching technical concepts. She is an active contributor to MediaArea's MediaConch, an open-source digital video file conformance checker software project, and Bay Area Video Coalition's QCTools, an open-source digitized video analysis software project. She holds Master of Library and Information Science (Archives) and Bachelor of Arts (Graphic Design) degrees from the University of South Carolina.

MediaArea: MediaArea, a subcontractor of RiceCapades, is a media research and software development firm, founded in 2007 by Jérôme Martinez. As a long-term collaborator with archivists and the primary author of MediaInfo, Jérôme Martinez manages MediaArea's business model in a manner responsive to the complex needs of archiving communities. Jérôme and Dave have worked as long-term collaborators in the field of open source software development for the needs of the preservation communities, including projects such as MediaInfo, MediaConch, QCTools, BWF MetaEdit, and DV Analyzer.

Jérôme Martinez is also the lead developer of MediaInfo, a ubiquitous file format inspection utility, and a technical consultant within the fields of broadcast video, audiovisual archiving, and web video. Jérôme's

work specializes in the analysis and categorization of audiovisual data as well as quality control, audiovisual metadata, and the development of open source solutions for media communities. Jérôme comes from a background of data analysis in France's telecommunications industries and began MediaArea as a center for the development of open-source multimedia technical assessment utilities.

Advisory Board
Ongoing advice and oversight will be provided by the Advisory Board to ensure that milestones are accomplished and that project work adheres to best practices and national technical specifications. Board members were selected for their preservation technology expertise and related project experience.

- Morgan Morel (Preservation Manager, Bay Area Video Coalition)
- George Blood (President, George Blood, L.P.)
- Skip Elsheimer (Founder, AVGeeks)

7. EVALUATION AND SUSTAINABILITY

We anticipate the evaluation of this project shall be clear to ourselves, participants, and onlookers as it progresses. We intend to document project milestones in GitHub and associate them with issues, releases, and commits so that the progress of the project is well-vetted and seen by the community of users. Additionally, we shall strive to ensure that the major outcomes of the project are easily understood and evaluable by users. MIPoPS staff will offer introductory tutorials and ongoing support for partnering institutions who may not be familiar or comfortable with the GitHub platform to ensure continuous contribution and use throughout the project.

Our team seeks to ensure that *Digital Video Commander* is serving its objectives by empowering a community of archivists working with digital video to confidently apply best practices through theuse of new tools and documentation around digital video transfer. Throughout our project, we will offer releases, daily builds, and engagement with users within the issue trackers and online documentation spaces of *Digital Video Commander*. We will strive to engage and expand a community of users and find opportunities where direct support, enhancements, guidance or consultation can benefit the project as a whole. We aspire that our work here would serve to advocate for and support more institutions reformatting more digital videotape by making the entire process more approachable, automated, and welcoming. Because of this, participation rates in online activities, download counts, and the volume of user engagement will aid us significantly in evaluating the impact of the project.

RiceCapades and MediaArea have well-established histories of freely providing long-term basic maintenance for all tools developed by them and work to maintain up-to-date versions of the tools they developed and release new versions of supported platforms and security fixes. For example, BWF MetaEdit lost its support for file drag-and-drop for the 2 latest versions of macOS due to updates within Apple's infrastructure. To keep BWF MetaEdit functional within a changing operating system, MediaArea performed the required updates within the BWF MetaEdit codebase to reinstate support for drag-and-drop in all versions of macOS. At the same time, MediaArea updated versions of third-party libraries in order to proactively fix some potential security issues.

We strive to establish *Digital Video Commander* as an open, collaborative, and welcoming project and plan to work in public online spaces such as GitHub, which provides us with systems for managing revisions, additions, or contributions to the source code. One method we will use to evaluate the success of the project is if the issue trackers and pull requests sections of our GitHub repositories are well commented upon and engaged with by our users. In regards to planning further development beyond the funded NEH development phases, we intended to follow similar models as used by our developers with projects such as QCTools and MediaConch, where the applications are often extended based upon sponsored features or consultation. MIPoPS will also become the institutional home of the project and continue to actively manage, maintain, and contribute to *Digital Video Commander* beyond the grant period.