Sustainability through Community

ffmprovisr and the Case for Collaborative Knowledge Transfer

Andrew Weaver
University of Washington, USA
weaveraj@uw.edu
https://orcid.org/0000-0002-9792-4036

Ashley Blewer
Artefactual Systems, MediaArea
USA
ashley.blewer@gmail.com

Abstract – This paper will present the online resource ffmprovisr as a case study in using open, online documentation as a shared educational resource. ffmprovisr is a website that supports the digital audiovisual community through technical education. This paper will cover how the website was developed, its role in fostering a collaborative educational environment, and its impact on the field and beyond.

Keywords – Collaboration,Open-source, Education, Audiovisual

Conference Topics – Building Capacity, Capability and Community; Collaboration: a Necessity, an Opportunity or a Luxury?

I. Introduction

Facilitating knowledge sharing between practitioners is one of the most foundational functions amongst the myriad missions of professional organizations. While this is accomplished via a variety of mediums, such as journals, conference presentations and organizational publications, the level of openness in both content creation and dissemination can vary widely across fields and formats. This paper will present 'ffmprovisr', an online resource maintained under the auspices of the Association for Moving Image Archivists' Open Source Committee, as a case study in using open source methodology for specialist knowledge transfer. In covering the development of ffmprovsr, its role in fostering a collaborative educational environment, and its impacts both within and outside of the field of digital preservation, this paper will demonstrate how open and collaborative approaches both complement and contrast with more traditional resources generated by professional organizations.

II. Problem Space

ffmprovisr's inception was brought about by the need to address the steep learning curve of the open source multimedia manipulation framework, FFmpeg. FFmpeg's website defines FFmpeg as "A complete, cross-platform solution to record, convert and stream audio and video."[1] In the field of audiovisual preservation this software suite, consisting of FFmpeg, FFprobe and FFplay, is one of the core tools for practitioners for performing tasks such as digitization, file characterizations, bulk file operations, data conversion and fixity checks on material targeted for preservation and access.

As is noted by archivist Dave Rice in [1], audiovisual preservationists have traditionally been reliant on software tools that were designed for the broadcast industry; a reliance that is increasingly problematic as needs diverge and support for legacy formats is dropped from commercial solutions. FFmpeg can play a significant role in empowering practitioners to perform preservation actions with highly targeted control, independent of ill-fitting consumer or broadcast oriented products, and as such, skill in its use is increasingly essential.

Despite its growing importance within the preservation community, a significant obstacle to its use is that FFmpeg is a program that runs only on the command line. For people who have not previously used a command line interface, interacting with their computer solely via text can be a new and daunting endeavor. Even when a user is comfortable with using the command line, FFmpeg is such a large and complex program that understanding the correct

[1] https://ffmpeg.org/

16th International Conference on Digital Preservation
iPRES 2019, Amsterdam, The Netherlands.

commands and syntax can also be intimidating and confusing. Users may also receive unexpected results and not understand the nuances of how files are being created or modified.

An issue with FFmpeg that is especially pertinent to people working in preservation is the implicit versus explicit actions that can be performed using certain parameters or "flags." FFmpeg is ideal for preservation as it allows very granular control of actions via specific flags. However, when those flags are not present, FFmpeg will make assumptions about what the user implicitly wants to do with a file, leading to unexpected results. This often occurs when a user specifies the container for a video file but does not specify the type of video codec to use for the video datastream inside of the container. Another example is failing to specify audio bit depths, leading to possible undesired loss of detail. Additionally, depending on interactions between flags (or lack thereof) FFmpeg may fail to create a file, exiting instead with an error.

The creation of FFmpeg scripts must be given careful thought so as to avoid unintentional repercussions, particularly when working on scripts that change many different kinds of video files into one specific kind.

III. History

ffmprovisr began as a small, personal proof-of-concept project in 2014 by archivist/developer Ashley Blewer, following her introduction to FFmpeg at the 2013 AMIA/DLF (Association of Moving Image Archivists and Digital Library Federation) Hack Day, where she worked with a group on a project to make a wiki-style resource for people interested in FFmpeg called "Fast Forward." In 2015, Blewer brought the ffmprovisr project to the AMIA/DLF Hack Day via the following proposal:

"I think it'd be fun to combine and continue to build up these two projects [my ffmprovisr and the Fast Forward wiki] into something better because ffmpeg continues to live on as a mysterious but necessary component of a/v archival practice. This project would be mostly R&D with some basic front-end web development skills (building forms). I feel this is a little out of the scope of hack day (and those greedy for rewards may seek refuge elsewhere) in that it's more of a REMIX project and a mostly- hack-the- docs- with- some- coding project, but if there is interest (there was last year, for ffmprovisr) – we will build the hell outta this!"[1]

During this event, the project had a team of around a dozen contributors, including contributions that came in remotely from Ireland and New Zealand. From that point onward, ffmprovisr was no longer a single person's proof-of-concept project but a community effort, and it has continued to move forward in that way. During this event, Blewer moved the resource site from her personal Github repository to being hosted at the AMIA open source committee's Github repository and web domain, where it can be accessed today[2].

For a few years after this, Blewer was the de-facto maintainer of the project and continued to update the resource with new scripts when discovered, or facilitate the addition of new scripts by other people.

In April 2017, archivists Reto Kromer[3], Katherine Nagels, and Kieran O'Leary joined Blewer in the role of Maintainer[4]. In November 2017, librarian Andrew Weaver was asked to join the group as a Maintainer due to his active code contributions and dedication to the project[5]. The purpose of a Maintainer is defined as a role supporting other people's issues and contributions, and striving to generally keep ffmprovisr as a happy and well-functioning space to learn about FFmpeg. The maintainers also encourage learning and support for related skills, such as building web pages and using git and Github.

[1] https://wiki.curatecamp.org/index.php/Association_of_Moving_Image_Archivists_&_Digital_Library_Federation_Hack_Day_2015#ffmprovsr

[2] https://amiaopensource.github.io/ffmprovisr/

[3] Reto Kromer has since stepped down as maintainer, but remains an active contributor.

[4] https://github.com/amiaopensource/ffmprovisr/commit/89039f55b3012f75c5b908c80cd2ebdc77b2f6a6

[5] https://github.com/amiaopensource/ffmprovisr/commit/5a3e437d76570f8f6ab78820626b12861709a922

16th International Conference on Digital Preservation
iPRES 2019, Amsterdam, The Netherlands.

ffmprovisr's maintainers are distributed across the globe and are readily available to answer questions and provide support. In addition to the officially listed maintainers, due to the project's open nature, anyone can help improve it by such means as direct code contributions, FFmpeg advice, questions and requests, reviews of commands and testing.

Since its inception, ffmprovisr has extended its reach to include not just helpful recipes for using the FFmpeg framework, although that remains its primary purpose, but also now includes support, education and recipes for related multimedia tools used in preservation such as ImageMagick, and audio extraction tools.

IV. Dual model for education

ffmprovisr functions as a model for open documentation and collaboration through both its usage as a shared internationally-referenced resource and through its educational function to help preservationists learn new skills through practicing them in a welcoming environment. ffmprovisr is an educational resource not solely as a webpage for looking up recipes or a space for skill-honing, but something more powerful by being both of these things working to benefit each other. The purpose of ffmprovisr thusly is two-fold, both for reading and gaining of knowledge and through the active support and practice of tool-building and contributing to the field. We will discuss first the benefits in ffmprovisr as a traditional educational resource and then go deeper into how ffmprovisr exists as a new kind of educational resource, expanding the ways in which archivists and librarians disseminate field-specific knowledge amongst each other to overall benefit the field at large, as a collaborative effort.

A. Traditional Educational Resource

ffmprovisr is a resource that works like a classic cookbook. It provides users with tasks they may want to do, such as changing a video format or creating a short clip from an existing video. Excluding an introductory section with higher-level concepts, each task contains a script that a user may copy and paste into their computer's terminal window. With some small modifications like adjusting filenames or output paths, the script can easily be adapted to a user's local settings or configurations. Below each script is a breakdown of each component of the script, explaining how it was built, why the specific component exists within the context of the larger task, how the user could modify the values to produce different results, and links to more robust documentation when necessary. This provides the user with a quick answer to their solution, an ability to know where and how to modify the script, general education about how FFmpeg works and information about any caveats that might cause inconsistent results from modifying the script. Additionally, ffmprovisr supports an offline mode and is installable via the Homebrew package manager.[1]

ffmprovisr, while a simple site and simple concept in nature, has a wide and lasting impact on practitioners in the field, many of whom are lone technicians working with limited time and budgets. By serving as a clearinghouse for frequently used commands in A/V preservation, as well as an annotated source of pertinent knowledge it facilitates both daily tasks as well as continuing professional skill development.

B. New Model of Educational Resource

In addition to being an example of a traditional online resource available to all, ffmprovisr exists as a new, unique model for knowledge transfer within and by professional communities. This resource is a living, active document featuring the latest information gathered and reviewed by dozens of experts in the subject. ffmprovisr goes beyond open publishing, by allowing for not just open access, but open collaboration at all points of creation.

This is in contrast to the traditional academic process, where the collection and dissemination of knowledge tends to follow a hierarchical pattern, wherein a researcher will perform their research, possibly keeping the findings closed until a final publication. This can then take months to years for information to be disseminated to a wider audience. Another common model is for a professional organization to assemble a group tasked with the generation of a technical document. These traditional processes can and do result in the creation of useful resources, however, their relatively closed nature can make them inflexible as well as exclusionary to a range of voices.

[1] https://brew.sh/

16th International Conference on Digital Preservation
iPRES 2019, Amsterdam, The Netherlands.

ffmprovisr is vetted by at least several maintainers and also the general open source community and public audience, so each script has been reviewed by multiple experts in the field before being published on the site. The resource can also be reviewed and updated at any point in time. This is, in essence, a more robust version of the practice of peer review in traditional academic institutions, but with faster turnaround, wider breadth, more encouragement of broader participation. This allows for more diverse and interdisciplinary contributions, increasing the overall scholastic rigor of the document. The contributors to ffmprovisr range from being internationally-recognized consultants in audiovisual preservation, archivist-developers at film and broadcast archives, digital preservationists at academic libraries, FFmpeg developers, professional media engineers, and many others. At the time of writing, ffmprovisr has had over thirty total contributors, representing over thirty institutions, and that number continues to increase.

ffmprovisr purposefully does not track users or gather statistics about usage, but its influence can be seen through conference proceedings, references to the tool on twitter, remixing, use in other applications, references in job postings[1] and anecdotal praise given to maintainers of the project from people working both within and outside of the archival field. ffmprovisr has been cited as an invaluable resource in peer-reviewed journal articles introducing FFmpeg to a wider Digital Humanities community[2]. A significant benefit of ffmprovisr is that it does not exist in a niche bubble, only to be seen and contributed to by a small pedagogical coterie within only one discipline. Rather, ffmprovisr can be seen and reviewed by anyone, allowing it to tap into a broad pool of expertise.

Beyond providing support for an increased understanding of FFmpeg, the maintainers of the ffmprovisr project aim to use the project to support education in other technical skills such as using the version control software git, the popular web platform Github, and writing HTML and CSS. This is done through active solicitation of contributions and coaching/encouragement to individuals seeking to add to the project. This has in turn fostered greater participation within the audiovisual open-source community and helps fill a core need within the libraries/archives professional field for technical training opportunities.

The codebase and website declares itself as having open Creative Commons license, CC-BY (free to use with a request for attribution)[3]. Because of this open licensing model, ffmprovisr has been "remixed" at least three times to produce similar resources based on the existing source code and project ethos: a guide for analog audiovisual cables, The Cable Bible[4], by Ethan Gates, and two sites to facilitate simple scripting in libraries and archives: Script Ahoy![5] by Dianne Dietrich and Jarrett Drake and The Sourcecaster[6] by James Baker and Thomas Padilla. ffmprovisr is a successful project and it is made more successful as a result of its permission to be shared and widely distributed, and have smaller sites get built off of the same model of open, collaborative resource sharing.

V. Conclusion

The ffmprovisr model of open, interdisciplinary and shared collaboration between colleagues is one that can and should be modeled by more professional organizations with a focus and mission around the development of professional practice. Its open nature, both to information creation and publishing, allows for a wide pool of contributors as well as vetters, and presents a strong alternative to more hierarchical processes. Additionally, it is flexible and responsive enough to remain current amongst changing technologies - a necessary trait for a digital preservation resource.

[1] http://web.library.emory.edu/documents/pa_staff_Audio-visual%20Conservator_Nov2018.pdf

[2] https://programminghistorian.org/en/lessons/introduction-to-ffmpeg

[3] https://amiaopensource.github.io/ffmprovisr/

[4] https://amiaopensource.github.io/cable-bible/

[5] http://dd388.github.io/crals/

[6] https://datapraxis.github.io/sourcecaster/

16th International Conference on Digital Preservation
iPRES 2019, Amsterdam, The Netherlands.

Acknowledgement

The authors of this paper would like to acknowledge the other maintainers of ffmprovisr, Katherine Francis Nagels and Kieran O'Leary, former maintainer Reto Kromer and all contributors to the ffmprovisr project. Thank you to all the FFmpeg developers. Thanks to Dave Rice for his mentorship and influence.

References

[1] Rice, D. (2015). Digitization Software Obsolescence, Too?. International Association of Sound and Audiovisual Archives (IASA) Journal, (45), 11–19. Retrieved from http://journal.iasa-web.org/pubs/article/view/79

16th International Conference on Digital Preservation
iPRES 2019, Amsterdam, The Netherlands.