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### Active and Retroactive Digital Newspaper Preservation

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#### Abstract:

*The University of Kentucky Libraries' (UKL) long-running efforts to document and provide access to the state's history via newspaper preservation have necessarily evolved over the last 80 years. As news formats and preservation technologies have changed, particularly in relation to born-digital media, the libraries' efforts have had to keep pace. The race to preserve these materials before they disappear or are locked away on media inaccessible to modern computers is not always chronologically linear, though. Digital archivists and librarians must sometimes straddle multiple generations of technology to successfully migrate, capture, and otherwise preserve digital publications, and there is no single guidebook to navigate the many ways to do so. This paper will explore ongoing efforts to preserve born-digital additions to the UKL's Kentucky Digital Newspaper Program collection, including a discontinued bilingual newspaper that arrived in our collection as a box of 326 discs in varying states of decomposition, as well as web archiving for actively published newspapers that are entirely and exclusively online publications.*

**Keywords:** Digital preservation, Web archiving, Newspaper preservation, Born-digital, Digital archaeology

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News has a death wish. At least from the perspective of an archivist attempting to preserve it, this is an incontrovertible fact. For multiple centuries, publishers of every variety of newspaper have chosen the most ephemeral media available as a means of distributing their journalism. The reasons are obvious. News is by definition “of the moment,” and its worth to most readers and publishers is dependent on its proximity to the events it describes. Thus, the cheapest, fastest

means of moving information and accompanying advertisements is the method a cost-conscious publisher will pursue. After all, they will be producing plenty more of it tomorrow and tomorrow and tomorrow. The temporary value newspaper subscribers generally attribute to the paper follows suit. We line our birdcages with them when we have finished. We lay them down for puppies to train on. That is to say, traditionally we encourage our animals to defecate on old media, so low is our esteem for the physical matter that brings us the news of the day. Some might argue that this philosophy continues into the digital age.

Just as archivists have struggled with the challenges of preserving the high-acid, low-quality paper stock of yesteryear, when it comes to preserving the born-digital newspapers of the past 20 years, publishers' commitment to the ephemeral has not diminished, but only grown more complex in the demands it places on organizations committed to news media preservation. This paper will document a few recent case studies as the University of Kentucky Libraries' Special Collections Research Center (SCRC) strives to continue preserving newspapers in their evolving formats, but doubtless the demands and methodology required for born-digital migration and preservation will continue to evolve. The diversity of recent accessions sheds light on the need for a multi-faceted approach to preserving digital newspapers and the variety of tools required for efficient migration and conversion from obsolete formats to preserve and provide access to these newspapers for the foreseeable future.

### **History of Kentucky Digital Newspaper Project**

For an excellent introduction to the University of Kentucky's history of preserving newspapers with evolving technologies and methods, Kopana Terry's 2009 article, "The Digitization of Historic Newspapers on Microfilm: The Kentucky Experience" in *Microform and Imaging Review* provides a timeline tracing the preservation work conducted by generations of librarians and archivists. Terry's follow-up 2015 paper with Eric Weig, "Preserving Kentucky's Newspapers: Analogue Beginnings to Digital Frontier," explicates the libraries' expansion of digitized offerings. From rescuing paper fragments, to microfilming newspapers as early as the 1940s, to then digitizing both paper copies and microfilm surrogates, the University of Kentucky Libraries' approaches to newspaper preservation have necessarily adapted alongside technological advances and the new challenges presented by novel formats. That trend continues, as recent newspaper donations to the Libraries have not included a scrap of physical paper in their accessions nor a frame of microfilm but are dependent solely on digital materials. In turn, those digital materials are not homogenous, sometimes even within an individual publication's accessioned materials, and require varied tools and workflows in order to best address their respective challenges and advantages.

### **Case Study: *La Voz de Kentucky***

For most of its publication, *La Voz de Kentucky* (generally running under the simplified masthead: *La Voz*) was a biweekly bilingual (Spanish/English) newspaper published in Lexington, Kentucky from 2001 until its run concluded in 2019. It provided local and statewide news with particular attention to information, events, opinion pieces, and other content relevant to the Latino population of Kentucky. Stories were published in pairs, an English and a Spanish language version side-by-side.

In 2023, *La Voz*'s owner and former publisher donated the publication to the Kentucky Digital Newspaper Program in the form of a box of optical media, a combination of CD-Rs and DVD-Rs, containing born-digital copies of the publication from various years. While the SCRC had a small number of print issues of the publication, the record carton of discs promised to fill significant gaps in the collection (Fig. 1).



*Figure 1: The La Voz optical media accession*

### **Mass Disc Migration**

The scale of the project (326 discs in total) prompted a search for a tool capable of expediting the migration of material from these discs, with an eye towards creating a workflow for future accessions containing significant quantities of optical media, and the possibility of reappraisal and migration solutions for material currently in the University of Kentucky Libraries collections. Research showed that the New York Public Library and British Library, among others, had significant success at an even larger scale with a multi-disc autoloading robot, the

Acronova Nimbie (Dappert). The libraries purchased a Nimbie USB Plus and added it to the born-digital Windows workstation. While some institutions have had a programming team automate more of the accessioning process with their Nimbie, in particular the IROMLAB project created by the National Library of the Netherlands (van der Knijff), for this inaugural project we chose to install very simple disc transfer software provided by the device manufacturer, aptly named Disc to Computer.

With assistance from Shell Dunn, an image specialist at the SCRC, we numbered the discs and constructed a spreadsheet to gather relevant metadata, including handwritten labels, size of transfer, and the number of directories and files on each disc (Fig. 2).

	Disc #	Transcription from case and/or disc	Contains Newspaper?	File Types	Size	Files	Folders	Notes
199	0198	Musica Mac 3	<input type="checkbox"/>	Audio/Music	660.3 MB	145	65	
200	0199	Musica 1	<input type="checkbox"/>	Audio/Music	574.6 MB	126	55	Music
201	0200	Suplemento 10-10-10	<input checked="" type="checkbox"/>	Multiple types	233.4 MB	97		3 La Voz: Vol 6 No 8: Apr 20-May 3, 2006_32 P
202	0201	Fotos Compu Andres Respaldo 2003-2005; September 26, 2007	<input type="checkbox"/>	Photograph	2.7 GB	1890	46	Photos 3 directories: 2003, 2004, 2005
203	0202	Recursos La Voz	<input type="checkbox"/>	Corrupt Disc	0.0 GB	0	0	Disc unopenable
204	0203	Blank	<input type="checkbox"/>	Photograph	101.2 MB	38	0	June- July 2007-08
205	0204	Blank	<input type="checkbox"/>	Blank disc	0 Bytes	0	0	empty
206	0205	Blank	<input checked="" type="checkbox"/>	PDF	30.5 MB	22	0	La Voz: Vol 8 No 16: Aug 7-20 2008_28 Page
207	0206	La Voz	<input checked="" type="checkbox"/>	Multiple types	12.4 MB	3	0	Logo
208	0207	Jet Set 2 Airport Lounge Riffage	<input type="checkbox"/>	Multiple types	586.9 MB	258	4	mostly mp3 files/ graphics/ mac install files/
209	0208	Adobe folders	<input checked="" type="checkbox"/>	Multiple types	127.5 MB	2192	156	La Voz: Vol 5 No 7: Mar 31-Apr 13, 2005_36
210	0209	Elmer, Espanol final	<input type="checkbox"/>	Audio/Music	88 Bytes	2	0	cda files
211	0210	Fonts P.C.	<input type="checkbox"/>	Multiple types	192.8 MB	2139	1	Fonts
212	0211	Blank	<input checked="" type="checkbox"/>	Multiple types	187.1 MB	96	3	La Voz: Vol 6 No 20: Seo 21-Oct 4, 2006
213	0212	Adobe Periodico	<input checked="" type="checkbox"/>	Multiple types	64.6 MB	5	0	Dr. Carrillo photo, Photoshop images

Figure 2: La Voz migration spreadsheet

The Nimbie's disc loader can accommodate up to 100 discs at a time (Fig. 3). While this invites a set-it and forget-it approach to optical media ripping, the physical condition of many of the discs in this collection required more manual intervention than we had initially anticipated. In addition, many of the discs were unlabeled, a few were completely blank, and some contained materials unrelated to *La Voz* or otherwise out of scope for the collection. To make the best use of the automated loading and ripping tool, we decided to marry our migration and appraisal processes. That is to say, we ripped first and asked questions later.



*Figure 3: Acronova Nimbie with expansion rods, capable of handling 100 discs*

Most of the *La Voz* discs arrived on spindles (a handful were in jewel cases) and prior to their donation to the Libraries they were stored in unknown conditions. Some of them were significantly scratched, showed signs of water damage, and for other less visible reasons failed to rip during the automated ingest. In most cases when this occurred, the Nimbie ejected the discs beneath the base of the machine to keep the failed discs separate from the successful rips, a valuable feature. In other instances, though, rather than ejecting the unsuccessful disc, the machine hung up in the middle of the automated rip process and continued to attempt to rip the same disc endlessly, requiring a manual restart of both the machine and the software. This process hang-up and restart extended the time necessary to transfer the materials, as did the manual transfer we attempted on individual failed discs using a single disk drive.

In later projects, we discovered that discs stored on the libraries' own shelves in a stable environment generally worked flawlessly on the Nimbie, so disc conditions are a significant factor to consider in evaluating the usefulness of an autoloader workflow. After five days of disc migration (most of which happened in the background while we conducted other work), the complete collection of discs was successfully ripped and backed up for more thorough appraisal, description, and file format intervention.

## **Appraisal**

While appraisal is generally thought of as the first step in archival work, in this workflow appraisal and description assumed a blended process. The *La Voz* materials were virus scanned and a full file manifest of their contents was created using TreeSize, software devoted to file characterization and cleanup. The full manifest revealed 54,873 files across 1,902 directories. It also illustrated that in addition to text and image files, the collection included considerable audio and video materials (Fig. 4).

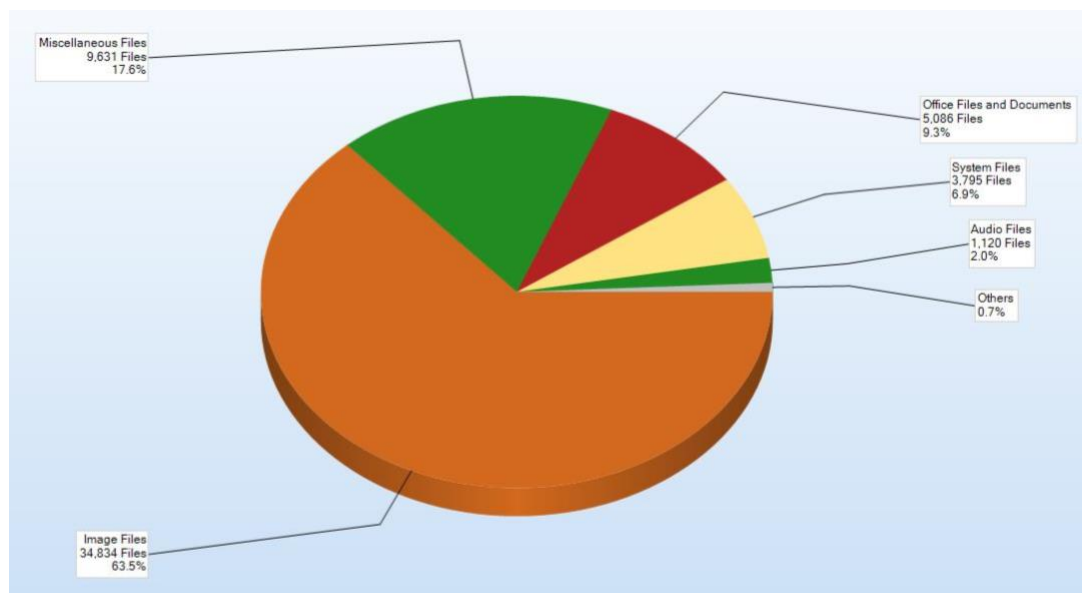


Figure 4: Transferred file characterization by file type

A more thorough exploration of the materials revealed that the collection contained more than just digital issues of *La Voz*. In addition to PDF copies of full issues, the discs also contained everything from backups of iTunes libraries, full-length feature films, and medical records belonging to the donor. We received permission from the donor to destroy material that was out-of-scope for the collection, and proceeded to examine what remained.

We were less concerned than usual with preserving the entirety of the collection and respecting original order, as our ultimate goal was extracting and preserving as many full issues of the newspaper as possible, but we did keep all of the photo libraries as well, with the possibility of adding them as a separate archival collection if possible. Happily, scattered throughout the collection were some full PDF issues of *La Voz*, print-ready and clearly labeled. Another 50 or so were packaged pre-flight PDFs where all that was required to prepare them for our preservation and access system was to concatenate the individual pages into single-issue PDFs. Unfortunately, there was enough variation from issue to issue in the way the files had been packaged for the original printer, and irregularities where some issues had multiple versions of a page, that we could not automate that concatenation. Fortunately it was a small enough batch that the necessary manual intervention was minimal and easily completed with Acrobat Pro.

## **Elderly, Finicky InDesign Files**

After plucking the low-hanging fruit of complete and clearly labeled PDFs, we addressed the more complicated work of re-engineering PDF versions of issues that had only arrived as older InDesign files with accompanying linked images and fonts. As is often the case with born-digital materials, if we had received these files in the archive 15-20 years earlier, this work would have been considerably simpler. The majority of the publications were prepared using Adobe InDesign CS3 on an Apple machine, and the resulting files were not fully compatible with modern iterations of Adobe Creative Suite running on the Windows machines we rely on in the SCRC (packaged fonts, in particular). In this instance, though, we were fortunate to have access to a 2009 iMac with a pre-Creative Cloud version of InDesign CS6, capable of rendering the full documents. The road to that revelation was a winding one, but once we sorted out the compatibility issues, we were able to export 15 full issues from the older InDesign files and accompanying media and fonts.

After this sifting, snooping, file union, and file reconstruction, we were left with a representative run of issues of *La Voz* in born-digital format that spanned 102 issues across eight years, from 2003-2011. We are in the process of finalizing their addition to the Kentucky Digital Newspaper collections online, but a recent interaction with the donor indicated there may be additional material available on a number of hard drives they would be willing to add to the collection. Thus, as in all born-digital collections, a follow-up process is likely necessary for the preservation and reintegration of this data with the issues freshly ingested and cleaned during the initial optical media accession.

## **Web Crawling: New Born-Digital Newspaper Accessions**

Another new, born-digital addition to our newspaper collection at the University of Kentucky Libraries has never been distributed in physical format. The *Kentucky Lantern* was launched in November 2022 as an independent newspaper, part of the non-profit States Newsroom project. All of its articles are published under a Creative Commons 4.0 license, and the Libraries received a deed of gift to begin archiving the *Lantern* in 2023.

One of the preservation advantages that physical paper has over a website is that even though high-acid, fragile newspaper is severely prone to decomposition, its physical format offers at least a degree of stability in the face of benign neglect. In 50 years, a widely disseminated newspaper will still, with a little luck, have a few copies floating around. However, despite the aura of omnipresence that a website exudes, at its core a website is secretly a single, unique digital object that we all share and can only access so long as the servers where it lives are functioning, paid for, and actively online. The moment that server is unplugged or a publisher

discontinues payment for web hosting is an event equivalent to every copy of a newspaper spontaneously combusting, whether on the shelves of your library or at the base of your parakeet's cage. Every single issue blinks out of existence in a moment.

While the *Lantern* was the Libraries' first website-only newspaper to be deposited in our Special Collections Research Center by an external donor, the SCRC had already created a web archiving workflow for capturing University of Kentucky publications and documents, thanks to the work of University Archivist Ruth Bryan and Assistant University Archivist Emily Collier. That work includes the ongoing crawl of the *Kentucky Kernel*, the university's student newspaper, which University Archives has been collecting from its physical form to its current born-digital format since 1915.

The University of Kentucky web archives is hosted and primarily crawled using Archive-It, the standalone web archiving and hosting tool run by the Internet Archive, makers and maintainers of the invaluable Wayback Machine. The initial impetus for starting a web archiving program at Kentucky in 2018 was the need to preserve university records that had increasingly shifted from print distribution to passive dissemination through the university website. Archiving the entire website became the most efficient means of gathering the vast majority of these documents, and it additionally preserved an overarching record of the university's history that might otherwise evaporate.

Collier has composed a tremendous manual for web archiving at the University of Kentucky Libraries and published it under a creative commons license for other interested individuals and institutions (Collier). Following this workflow, I ran an initial test crawl of *The Kentucky Lantern* using the Brozzler crawler within Archive-It and returned the following day to conduct a quality control check on the finished product. The initial test crawl was a considerable success, and it became apparent that the *Lantern* was one of those conscientiously constructed websites that lends itself well to web crawling. It is likely not representative of most newspapers, but in this instance all the text, layout, images, and multimedia elements rendered beautifully in the Archive-It playback system. The archived version of the pages within the site load more slowly in Archive-It than they do on the live *Lantern* site, but this is typical of all site playback in Archive-It.

With a successful test run in hand, we determined that the *Kentucky Lantern* warranted a recurring monthly crawl given the data budget we have with our Archive-It contract and the fact that, at present at least, the *Lantern* is live, un-paywalled, and maintains an active repository of all old news stories available to crawl. While it might be nice to know how the *Lantern* front page appeared every day, the articles and images are all being captured and preserved in our searchable web archives.



## **Borrowing Trouble: The Problems We Did Not Have**

It may seem like either ill-advised gloating or looking an archival gift horse in the mouth, but it is worth pausing to document here why this worked so well, how we are preparing for future web archiving that does not proceed as efficiently, and how to handle the very difficult outliers one is likely to encounter in web archiving newspapers.

As noted, one advantage we had in preserving the *Lantern* was its archivability. We have not always been so fortunate in all our website donations. One way librarians and archivists can prepare before launching a crawl is to visit Archiveready.com and test the URL you intend to crawl (Banos). Archiveready examines the relevant site and provides a list of potential problematic elements or metadata that might interfere with a repository's ability to effectively archive that site and culminates in an archivability score (IFLA.org, for instance, merits a 82% archivability score). If a repository is working closely enough with the publication whose site they are archiving, they might even be able to share those results in the hope of the publication's website administrators addressing possible problems prior to archiving.

Another factor in the *Lantern's* archivability which is atypical of many newspapers is its simplicity of design. *Kentucky Lantern* is built on the WordPress platform, and it does not use pop-ups, it has no social media widgets, it does not require a user login for visitors, and it does not use embedded videos or make use of APIs or extensive embedded iframe features. For websites that do, the Brozzler crawler within Archive-It may be able to record those materials correctly, but they very well may not.

Our current workaround for sites that contain too much dynamic content for Archive-It to handle is to initiate a crawl with Webrecorder, a separate tool that allows users to visit a page, activate the Webrecorder browser plug-in, and interact with the various dynamic elements (such as photo galleries, video, scroll-loading, and other dynamic elements). We are then able to download a WARC file, the preferred web archiving format noted in the Library of Congress Recommended Formats Statement (Library) and upload it to Archive-It to join the rest of the University of Kentucky Libraries Web Archives Collection.

## **The Really Tough Cases**

For truly complex newspaper sites, especially data journalism sites that make use of databases or rely on server-side actions or search fields for essential functions, web crawling simply cannot capture the elements necessary to archive a fully functional copy of the site. There is a relatively new tool worth exploring, Reprozip-Web, devoted to capturing exactly such sites. It is an IMLS grant-funded project built by researchers at Columbia University Libraries and Webrecorder that can trace server actions, capture server-side databases, and then crawl elements of a website on

the public web with Webrecorder, and package them into one file capable of full playback (Boss). We used ReprZip-Web for a digital humanities website we were tasked with archiving and found it worked well, but it is only possible to use the tool under the following circumstances:

1. You have access and permissions to the relevant website's server or a packaged VM copy of the server. Unlike most web crawler-based archiving, having access to the site's public facing pages is insufficient for capture.
2. The relevant site does not rely heavily on external APIs for the data it is using. The relevant material needs to be on the server you have access to, or harvestable via the supplemental Webrecorder crawl.

If those conditions are met, Reprzip-web may be the tool an institution needs. The widespread adoption of the RPZ files that Reprzip-web produces for playback is not yet established, and thus the format's durability, as with most digital file types, is not yet discernible. Nonetheless, it is the only means of capturing certain sites at present and offers hope for this necessarily complex variety of web archiving that would otherwise be impossible.

### **The Intellectual Union of Physical, Digitized, and Born-Digital**

While the work of ingesting born-digital newspapers is a challenge in itself, describing those materials in our finding aids and catalog presents its own questions. Collections hosted on Archive-It make use of Dublin Core metadata fields (Fig. 5.)

Title: Kentucky Lantern website  
URL: <https://kentuckylantern.com>  
Description: The Kentucky Lantern is an independent, nonpartisan, free news service based in Frankfort, Kentucky, part of States Newsroom, a nonprofit network of journalists that works to fill gaps in state government reporting caused by the declining numbers of state and local journalists. Captured 14 times between July 21, 2023 and May 06, 2024  
Videos: 3 Videos Captured  
Subject: Health – Kentucky, Government – Kentucky, Environment – Kentucky, Economy – Kentucky, Journalism – Kentucky  
Creator: Kentucky Lantern  
Coverage: Kentucky  
Format: website  
Type: electronic newspaper  
Rights: "Our stories may be republished online or in print under Creative Commons licence CC BY-NC-ND 4.0."  
Collector: University of Kentucky Libraries Special Collections Research Center, University of Kentucky Libraries

*Figure 5: Dublin Core metadata in Archive-It (University)*

In ArchivesSpace, our archival management system, we use DACS (Describing Archives, a Content Standard) for archival description. Many of the metadata fields are shared between Dublin Core and DACS, if only in slightly different format and syntax, but they vary enough that one cannot automatically populate one with the other and duplication of manual effort is necessary to a degree. Happily, Bryan and Collier have composed another shared document, Web Archiving Program Description Procedures, which is available online for general use, and which lays out the methodology we use at the SCRC (Bryan). The finding aid for the *Lantern* is not yet live, but once published it will in turn be described in the UK Libraries OPAC via a corresponding MARC record, thus necessitating a third layer of description across our systems.

This sounds like considerable labor that could lead to researcher confusion if the end result is a convoluted catalog record, but the University Archivist has worked with the cataloging department to integrate that description for the *Kentucky Kernel* as a pilot project, so an established methodology is in place (*Kentucky Kernel*). As the finishing touches are put on these materials and their finding aids, pre-existing processes are in place to effectively integrate these born-digital materials with their analog and digitized counterparts in our discovery and access systems.

## **Conclusion**

The challenges central to newspaper preservation have long been addressed by creating more durable surrogates to preserve valuable information on disintegrating media. From microfilm to digitization and now to digital transformation of born-digital news, the work of preservation has kept pace where it could as media formats have evolved, but even more innovation and resources will be necessary to maintain the standards we hope to uphold as most current news is born-digital, consumed-digital, and discarded-digital.

The two primary case studies in this paper benefited from good fortune, at least as much as good practice, in that both resulted from active intervention and participation by amenable donors, both arrived in a readable and transferrable format, both were donated to an institution that has been willing and able to invest in born-digital archiving, and most importantly, both found themselves at an institution with a long history of newspaper preservation. Also, it happened to be the workplace of Kopana Terry, a passionate advocate for the importance of this work. Those conditions were necessary for success in the retroactive archiving of *La Voz* and the active and ongoing archiving of the *Kentucky Lantern*. They will not always be present if we cannot communicate the value of our work as well as the best of our predecessors did as they rescued “worthless” newspaper from fuel for campfires or worse, the bottom of the cage. In addition to learning, sharing, and helping develop new tools to keep this work possible, it is crucial that we communicate its value and integrate new, born-digital material into our collections alongside our burgeoning collections of digitized news.

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