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Libraries, Disability Services Offices, and Repositories:

A Case Study from the Educational Materials Made Accessible Project

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This paper provides a case study of one library's efforts to establish a deposit workflow into the Educational Materials Made Accessible (EMMA) repository. EMMA, which seeks to enable broad accessibility to digitized texts remediated for patrons with print disabilities, runs on a shared storage and access infrastructure provided by the University of Virginia. The authors, librarians at the University of Illinois Urbana-Champaign, detail how EMMA project staff evaluated the needs of campus disability services offices (DSOs) and utilized the expertise of academic librarians to create repository infrastructure to simplify access to remediated materials. They present a case study of how they worked with their own university's DSO to create an institutional workflow for the deposit of locally digitized works into the EMMA repository. They conclude with lessons learned for librarians who plan to engage with DSOs to establish collaborative workflows. This project enhances the discoverability of remediated texts and enables wider use and reuse of these materials across institutions.

Background

In 2014, librarians took note when the United States Court of Appeals for the Second Circuit found in favor of HathiTrust in a lawsuit brought by the Authors Guild.[1] The suit had asserted that HathiTrust's repository of digitized materials, specifically those works still protected by copyright, did not fall under fair use protections of domestic copyright law. The court found against the Authors Guild, affirming that digitization with the goal of making works accessible to the print-disabled is a legitimate fair use. This was the position held by the National Federation of the Blind, which had joined the suit as co-defendants of HathiTrust. But the Second Circuit's finding, or at least the section that addressed disability services, was not so much an acknowledgment of what HathiTrust had already done for disability services, as it was of the potential to use shared repositories to make a future impact on accessibility. In response in part

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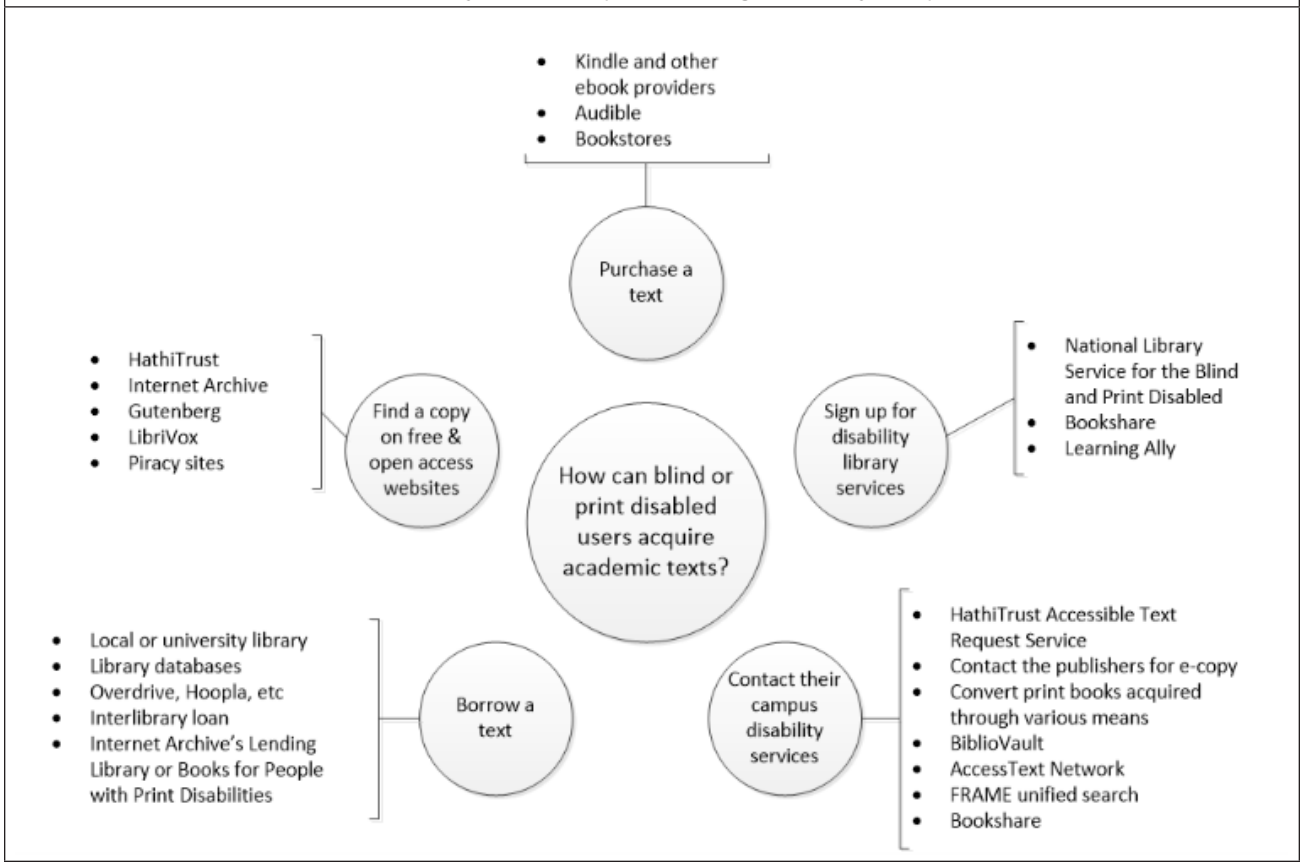
to the finding, repository services like BookShare, the HathiTrust Digital Library, and the Internet Archive have offered their own versions of print disability access.[2] Nevertheless, the potential to coordinate broad accessibility has remained largely untapped by libraries and open repositories.

The Educational Materials Made Accessible (EMMA) project constitutes an earnest effort to fulfill this potential by using librarians' knowledge of bibliographic metadata, repository technology, copyright law, and organizational partnerships to help disability services organizations (DSOs) serve the access needs of students and scholars with print disabilities. The goal of this project is "to reduce the duplication of effort in disability service offices at colleges and universities across the United States, and thereby to enable faster, better service for those needing accessible learning materials."[3] EMMA provides coordinated access to its own repository of remediated materials, the holdings of partner repositories Internet Archive, the ACE Portal, and OpenAlex, as well as the University of Michigan Press. It provides a web-accessible architecture for user authentication, search, and download, and allows universities to upload their locally remediated texts to EMMA. As such, it serves as a hub for locating remediated or remediable files from text repositories, as a single location to search across these repositories, and as a home for the deposit of remediated texts.

As Zaytsev showed in the paper "Collective Challenges Require Collective Solutions,"[4] students and scholars must navigate a constellation of different options and services to acquire accessible texts (Figure 1). Strategies range from purchasing texts from vendors of ebooks and audiobooks on the open market; finding

FIGURE 1

Graphic Showing How Blind or Print-Disabled Users Acquire Academic Texts. Options include purchasing a text, finding a copy on free and open access websites, borrowing a text, signing up for nationally available disability library services, or contacting their campus disability services (credit: Angelina Zaytsev).



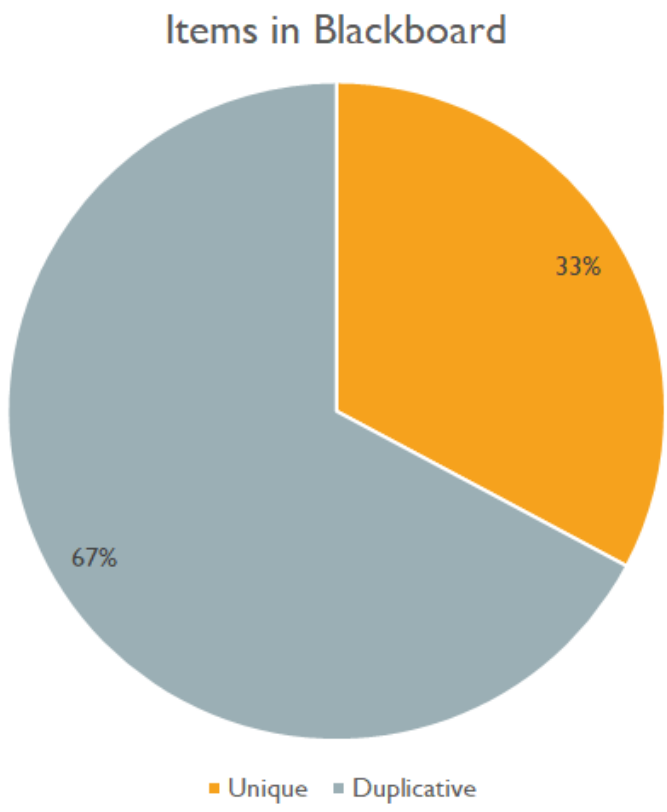
copies of public domain materials openly available in repositories like HathiTrust, Internet Archive, Project Gutenberg, or LibriVox; finding copyright-protected materials on piracy sites; borrowing accessible texts from a library, library database, or interlibrary loan; utilizing a nationally available disability library service like Bookshare, Learning Ally, or the National Library Service for the Blind and Print Disabled; or acquiring texts through a campus DSO. These campus units employ staff who work on behalf of users to broker access to materials though a variety of means, including requesting accessible versions of materials directly from publishers, conducting in-house digitization and remediation, and retrieving accessible materials via external repository services like the HathiTrust Accessible Text Request Service, Bibliovault, the AccessText Network, or Bookshare. EMMA seeks to simplify this work by centralizing large-scale digital repository infrastructure for DSO staff.

EMMA has its origin in a 2015 research grant awarded by the Institute for Museum and Library Services to John Unsworth and Laura Wood that explored library engagement in disability services.[5] The grant resulted in the report "Libraries: Take Aim!," which issued a call to action for libraries to fill gaps in the present landscape of disability services for students and scholars in higher education. The report asserted that staff in DSOs face costly, systemic challenges in providing accessible materials to their patrons, that they do so with little coordination of effort with other institutions, and that libraries are well-positioned to support such work given their field's expertise in digitization, metadata, and repositories.[6]

Furthermore, students in higher education often need access to the same materials. In 2019, the tool Ally, which assesses the accessibility of materials uploaded to learning management systems, disclosed that only 33%

FIGURE 2

Pie Chart Showing that as of 2019, Only 33% of the 825 Million Texts in Blackboard Were Unique, Demonstrating Frequent Student Need for the Same Materials



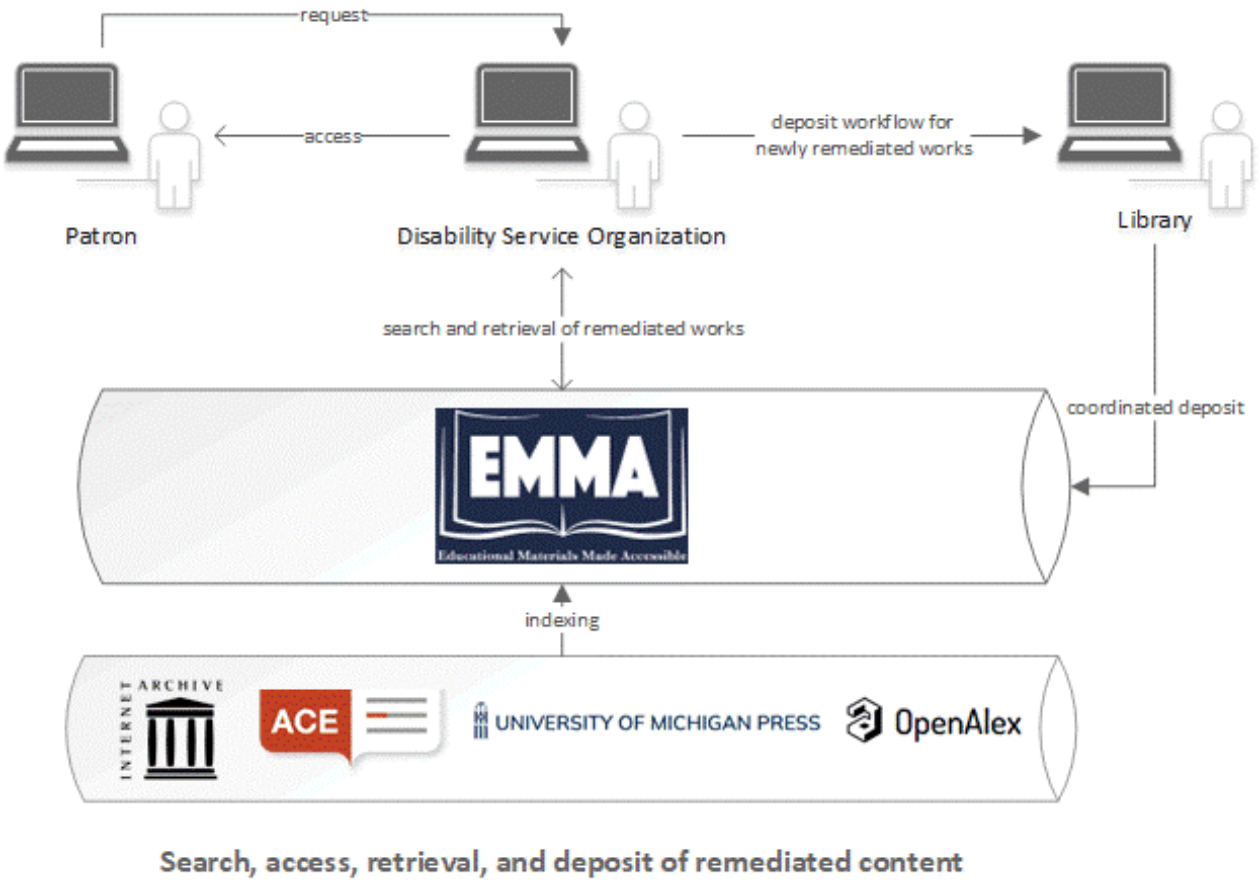
of the 825 million texts in Blackboard were unique[7] (Figure 2). When students request these texts from their DSOs, the same remediation work is duplicated at multiple colleges and universities. EMMA seeks to minimize this duplication of effort by creating a centralized mechanism for legally sharing remediated files between DSOs across academic institutions.

Following the conclusion of the IMLS-supported research grant, EMMA received two implementation grants from the Andrew W. Mellon Foundation, the first from 2019-2021 and the second from 2021-2023. In its grant phase, the project was known as "Federating Repositories of Accessible Learning Materials for Higher Education" (FRAME). Both grants were led by Principal Investigator John Unsworth at the University of Virginia, with university partners at George Mason University, Northern Arizona University, the University of Illinois Urbana-Champaign, and Vanderbilt University (the University of Wisconsin was prevented by their general counsel from receiving grant funding as a partner but staff there did participate in testing the EMMA system), and repository partners Bookshare, HathiTrust, and the Internet Archive. The second phase saw the addition of partners the ACE Accessible Content E-Portal and the Ohio State University.

The first phase of the EMMA grant produced the report *The Law and Accessible Texts: Reconciling Civil Rights and Copyrights.*[8] The report investigates the disability services content access workflow, which consists of

FIGURE 3

Diagram Showing Content Request, Access, Deposit, and Indexing in the EMMA Workflow. In it, a patron requests that a Disability Services Office help provide access to a book. The DSO searches and retrieves remediated works from EMMA. EMMA indexes works held in the Internet Archive, the ACE Portal, OpenAlex, and the University of Michigan Press. Meanwhile, a Library coordinates deposit of works with the DSO into EMMA.



a student requesting access to materials and DSOs remediating digital versions of said materials, delivering the materials to the student, and retaining these remediated materials for the long term. Importantly, the report's authors determine that all stages of this workflow are bolstered by meaningful legal protections. The United States constitution, disability and civil rights law, and copyright law provide domestic educational institutions with considerable protection when providing access to information resources to students with disabilities. Internationally, the Marrakesh treaty and its 88 signatory countries have declared a shared commitment to accessibility. This confluence of law and treaty provide broad protections to educators and libraries in the DSO space.

The EMMA repository, available at https://emma.lib.virginia.edu/, aggregates descriptive metadata for texts that are available in the Internet Archive, the ACE Accessible Content E-Portal, OpenAlex, and the University of Michigan Press (Figure 3). Initially, the EMMA system relied on authentication components from Benetech's Bookshare repository, with a service back end and web front end designed and supported by the University of Virginia, and content files stored in the university's cloud storage. It indexed content from Bookshare as well as texts available in the HathiTrust Digital Library, with the intention of allowing for the download, remediation, and resubmission of these remediated texts back to the HathiTrust and other partner repositories. However, Bookshare and HathiTrust both retracted from EMMA at the end of 2023, as their own user agreements would not allow the sharing of material sourced from them through EMMA. Subsequently, the EMMA team abandoned plans for redepositing remediated texts back to contributing repositories. Following its break from BookShare, the University of Virginia assumed responsibility for repository authentication features, rebuilt the system's federated index, and engineered Shibboleth authentication for users at InCommon universities.

Evaluating DSO Practices and Establishing EMMA Workflow Tools

Academic libraries and DSOs both digitize books, but they do so with different aims (Table 1). In general, libraries take their time churning through a backlog of undigitized materials and making them openly available on a rolling basis, whereas DSOs need to digitize on a tight deadline in order to deliver materials to students in the current or upcoming academic semester. Libraries digitize their own collections, prioritizing historical publications in the public domain, whereas DSOs frequently digitize newly published materials that are required reading for courses or dissertation research. Both libraries and DSOs process digitized texts using optical character recognition (OCR) software to obtain a searchable transcript, but libraries often accept imperfection and rarely revise these transcripts. By contrast, DSO patrons need a clean transcript that can be clearly articulated by screen

TABLE 1

Contrasting Approaches to Digitization Taken in Libraries and Disability Services Organizations

Factors in Digitization	**Libraries**	**DSOs**
Urgency	Deadlines are rare; digitization occurs without a rush.	Students need access in the current or upcoming semester.
Copyright	Content from the public domain takes priority.	Students often need newly published materials still protected by copyright.
Transcription	Imperfections in optical character recognition (OCR) results are tolerated.	Students using screen reader software need clean and accurate text transcripts and alternate text for images, necessitating hands-on remediation.
Access	Deposit into open access repositories is preferred.	Access is locally managed on a per-user basis.

reader software, which often leads to DSO staff painstakingly revising OCR results and adding accessibility features like structured headings and alternate text for images. Libraries make content available in open repositories and their own digital collections platforms, but DSOs tend not to place their digitized content into any sort of shared repository environment, managing it instead on local storage. The lack of repositories for sharing remediated texts is an important gap that the EMMA project aims to fill.

From 2021 to 2023, an EMMA project team consisting of project managers, repository developers, and metadata specialists engaged partners from libraries and DSOs in monthly discussions of their respective digitization policies and procedures. These planning efforts led to the recognition that digitization and text remediation practices differ not only between DSOs and academic libraries, but also between individual DSOs. These differences are most apparent in how DSOs meet the diverse needs of patrons based on their individual preferences for file types and their differing access to assistive hardware and software. To understand the extent of needs and common practices across institutions, project planners and developers documented multiple local institutional practices around file formats, bibliographic metadata, and remediation actions.

DSO remediation efforts result in a variety of file formats to meet user needs. These include the Braille Ready Format (BRF), the Digital Accessible Information System (DAISY), Word documents, and PDF documents (Figure 4). While DSOs remediate resources primarily based upon the distinct needs of specific users, the staff at each DSO also develop local practices for trusted file formats and technologies in common use in their user community. Whereas students at one university may prefer Microsoft Word files for use with screen reader software, students at another institution may prefer PDF or ePub formats. Even if a DSO overwhelmingly provides materials in one of these file formats, their practices may change from one semester to the next based

FIGURE 4

A Sample EMMA Item in Multiple File Formats (in this Case, Daisy and ePub)

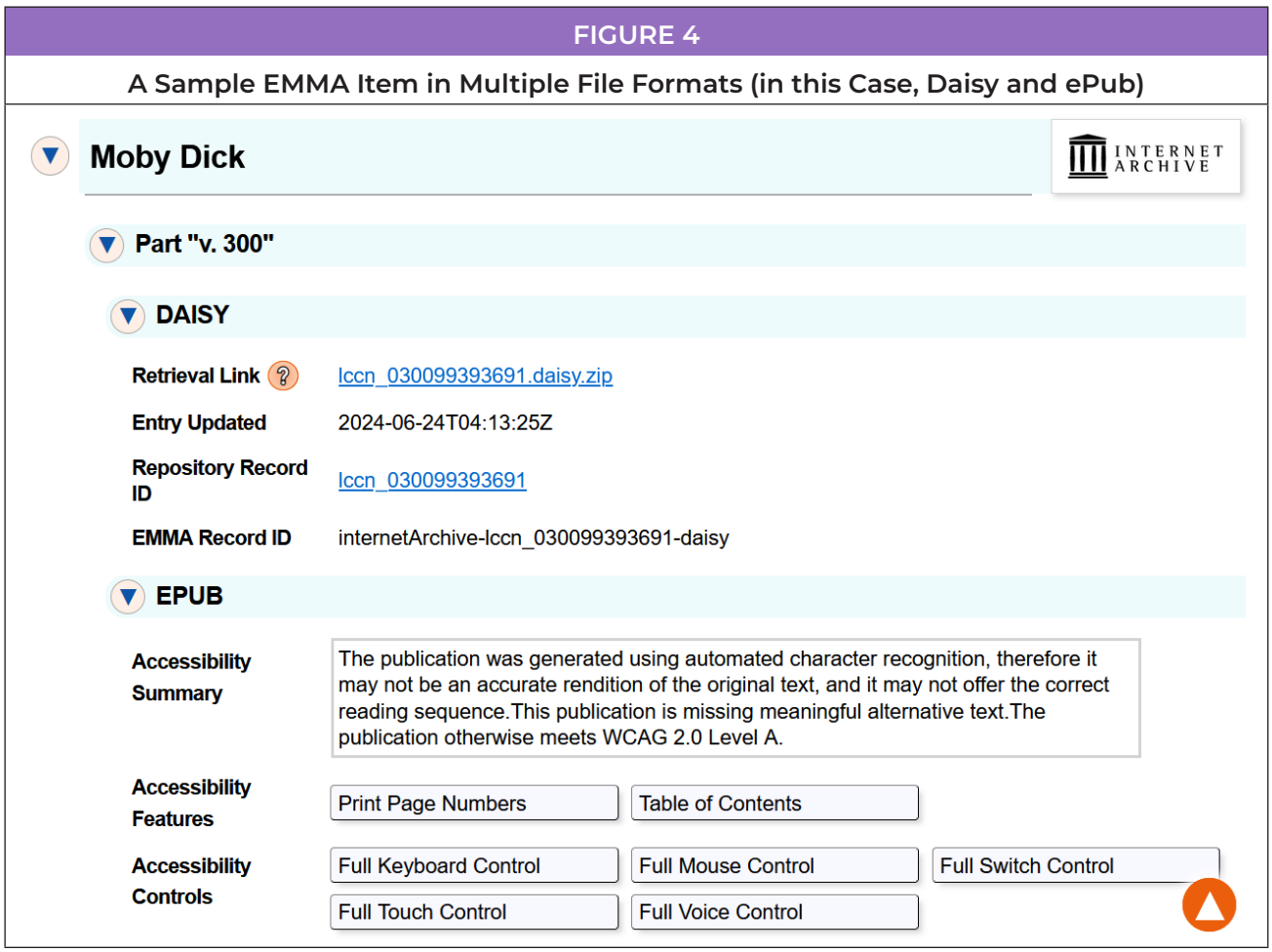
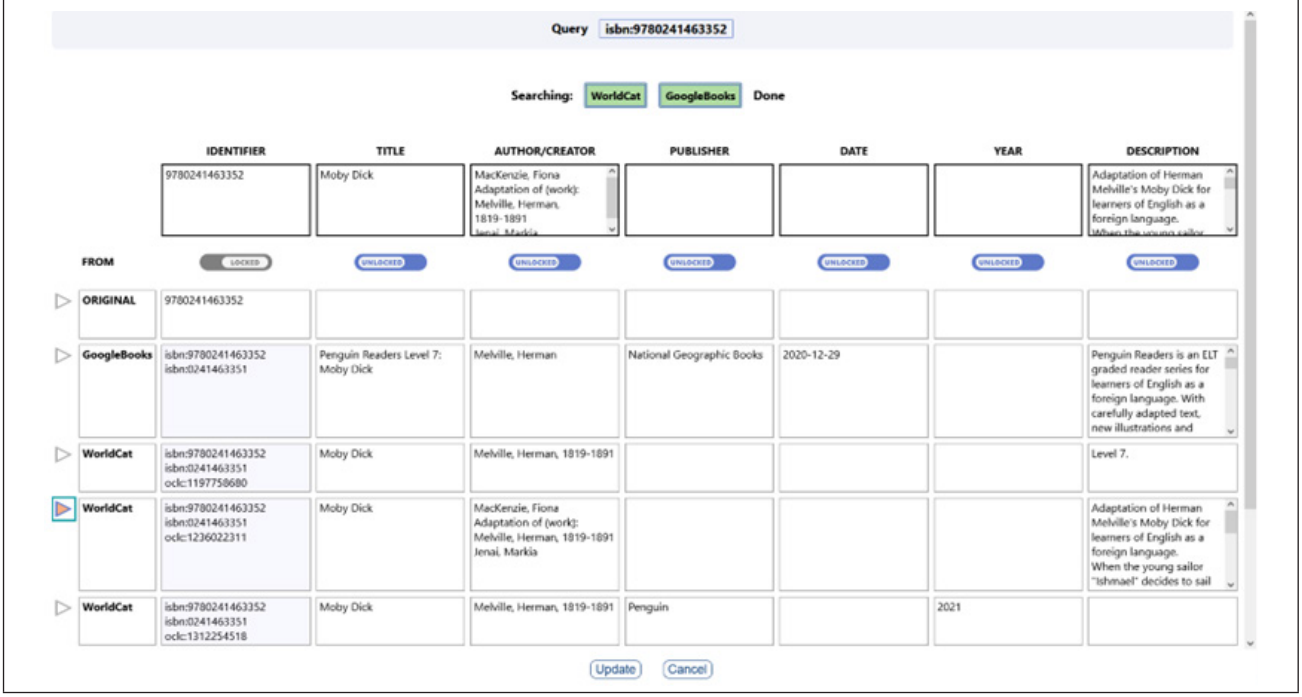


FIGURE 5

Screenshot Showing Metadata Retrieval in the EMMA System Using its Worldcat and Google Books Lookup Feature



on the preferences of new and existing patrons. For example, a DSO that provides electronic texts meant for screen readers to the majority of its users may also provide items in Braille format for others. For this reason, the EMMA architecture is designed to accommodate and accept multiple file formats.

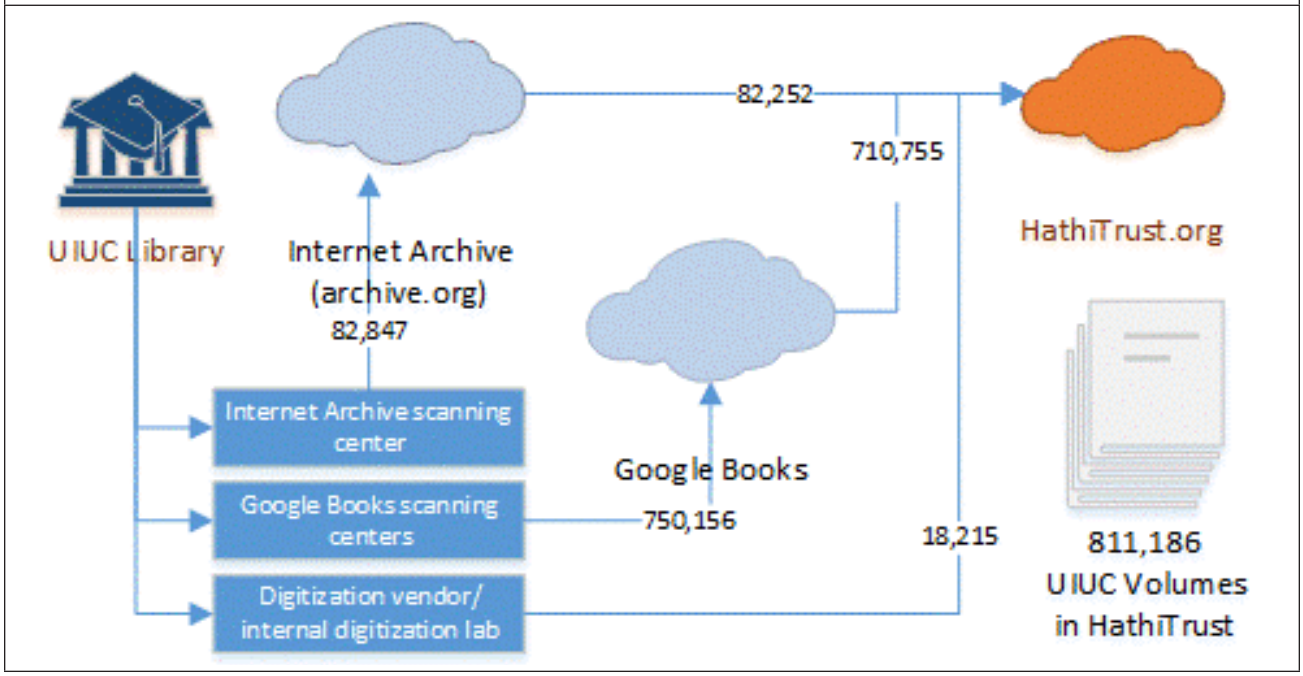
A file format, however, is simply a container. To better understand what additional work goes into structuring accessible files at DSOs, EMMA's metadata consultant Bill Kasdorf led an inquiry into how DSOs describe their own remediation actions. Remediation often includes measures like correcting OCR, adding headings for screen reader navigation, adding navigation links to a table of contents, providing alternate text for images and data visualizations, introducing structured tables, or formatting non-text information like math or chemistry notation with alternate text. Understanding the variety of institutional DSO remediation procedures helped inform the design of a common metadata standard and deposit interface for content bound for the EMMA repository.

This inquiry also extended to bibliographic metadata. The EMMA project found that institutional DSOs vary in how much bibliographic information they gather during remediation. This posed a challenge to designing a common metadata model for remediated works. EMMA partners discussed how they might design a tool that addressed two needs: first, assisting DSOs with identifying remediated resources and populating metadata through automated processes; and second, using the tool and its automated functions to allow DSOs to supplement the bibliographic metadata they had initially gathered. This informed the design of EMMA's bibliographic lookup tool, which allows users to populate bibliographic metadata by querying Worldcat and Google Books based on ISBN and other fields (Figure 5). There is great benefit to using external tools for populating bibliographic metadata available in WorldCat and Google Books. It means that users do not need to be experts in MARC cataloging to assign high quality bibliographic metadata to EMMA records.

The EMMA project team encouraged flexible deposit workflows by offering both a single and a bulk file upload tool. In the single file upload feature, a user adds a file and enters metadata in a form-based interface before submitting. This allows the user to add metadata as needed to enrich the description of the resource or the

FIGURE 6

Diagram Showing Digitization Workflows in Place at University of Illinois at Urbana-Champaign Library into Internet Archive, Google Books, and HathiTrust



remediation process. Information on the remediated features of a text is required for EMMA deposit and assists in the discovery and access of these materials.

Implementing Local Workflows at University of Illinois at Urbana-Champaign: A Case Study

The University of Illinois Urbana-Champaign library is home to a mature digitization program for print materials. It houses a digitization studio with a variety of camera equipment for shooting rare materials, as well as an Internet Archive scanning center for digitizing general collections. In addition, the library not only outsources the digitization of some brittle books, general collections materials, microfilm, and newspapers to vendors, but also coordinates the mass digitization of general collections with corporate partners like the Google Books project. Since 2007, the library has digitized over 810,000 volumes with corporate partners, 82,000 volumes in partnership with the Internet Archive, and 18,000 volumes locally (Figure 6). The library's policy is to deposit all public domain books it and its partners scan into the HathiTrust Digital Library and has adopted workflows to this effect. To date, Illinois has deposited more than 800,000 items to the HathiTrust Digital Library.

In addition to the library's in-house digitization efforts, Illinois' Disability Resources and Educational Services (DRES) also provides digitized content to its users as the university's dedicated DSO. DRES staff digitize books or book chapters required by course syllabi or graduate students' dissertation research, and remediate resources by converting documents to different formats, transcribing text or providing alternative text, and adding accessible headings. In the last four academic years from 2019 to 2023, DRES has remediated resources for 234 students who participated in 705 courses. In this time DRES remediated 270,263 pages, constituting 8,558 hours of conversion work. This included, but was not limited to, the remediation of 747 books, 327 articles or book chapters, and 962 pieces of sheet music (Table 2). The volume of output, the types of resources, and the requested remediations varied from semester to semester and were highly dependent on the needs of individual

TABLE 2

Statistics for DRES' Remediation Output for Academic Years 2019-2023

	AY 2019-20	AY 2020-21	AY 2021-22	AY 2022-23	TOTAL
Individuals Served	63	67	54	50	**234**
Classes Served	222	136	165	182	**705**
Page Count	84,947	15,375	88,057	81,884	**270,263**
Book Count	146	256	195	150	**747**
Article/Chapter Count	74	169	39	45	**327**
Sheet Music Count	0	0	0	962	**962**
Conversion Hours	5,501.9	1,242.9	1,153.6	658.8	**8,557.2**

students, the types of materials, and the requested remediations.

Before moving forward with uploads to the EMMA repository, librarians at Illinois worked with DRES staff to discuss their shared workflow options. They sought to establish workflows for two types of content: first, a retrospective effort to make legacy materials available in EMMA; and second, a future-oriented workflow for materials produced in the course of upcoming academic semesters. The working assumption was that DRES would provide the files and librarians would upload them into the system and ensure the highest metadata quality. DRES tracks its remediation efforts by academic semester. For a future-oriented workflow it made the most sense to plan EMMA deposits for the end of every semester. The metadata required for deposit was of two types, one composed of the sort of bibliographic description that librarians are quite comfortable with, the other representing information about the nature of remediation. This latter information constituted new territory for the librarians on the project.

The library's metadata services are structured using a consultative model. The library's Acquisitions and Cataloging Services (ACS) unit is staffed by a Metadata Librarian who advises on metadata schema and application profiles for content curators who create metadata for deposit into the library's digital collections. This means that the library's metadata services are not designed in the manner of a metadata production group, but rather

FIGURE 7

The Local Input Guide that the Metadata Librarian at University of Illinois at Urbana-Champaign Created. This guide was intended to provide definitions of metadata properties, offer input guidelines, and ultimately lower the barriers to metadata input by employees at DRES who were non-specialists in metadata.

Metadata Properties and Elements	Content Values	Definition	Input Guidelines	Examples of Content
Date Accepted	(Alphanumeric)	Date entered into EMMA.	mm/dd/yyy	10/13/2022
Copyright Date	(Alphanumeric)	The publication or copyright date of the resource.	Input as yyyy	1987
Source of Content	(Values-See below)	The source of the original resource. This is similar to Source Repository, but includes other non-repository options.	None. Dropdown menu. See metadata subelements below.	(See fields below)
	Bookshare	Use if the file was imported from BookShare.		
	HaithiTrust	Use if the file was imported from HaithiTrust.		
	Internet Archive	Use if the file was imported from Internet Archive.		
	EMMA	Use if your file was an original scan, or is derived from a source other than one of EMMA's participating member repositories.		

are focused on metadata schema design and quality control across its digital repositories. This ran somewhat counter to the earlier expectation in the EMMA project of a handoff from DRES to a library-based metadata team, especially considering the fact that DRES staff are the university's resident experts in the disability-services-specific terminology required to populate those sections of the metadata records that relate to remediation.

The EMMA project metadata model includes 45 properties grouped into four categories: identifiers, bibliographic metadata, administrative metadata, and remediation metadata. While the model gives basic information on each property, such as definition and repeatability, it does not provide specific guidance on input. Librarians at Illinois developed local documentation to identify which of the EMMA fields were most relevant to their needs, in order to ensure consistency in resource description and lower barriers to entering the metadata for DRES partners. The Metadata Librarian reviewed the project's metadata model and began to expand upon it. This document would guide the workflow of DRES' input of both legacy and newly remediated materials into the EMMA repository (Figure 7).

As previously mentioned, EMMA allows for both individual and bulk submission of resources. All uploads require that the user provide the remediated file of a resource as well as descriptive metadata that will allow other users to evaluate whether the resource meets their needs. DRES determined that they would employ both the single and bulk upload tools. They would complete the upload of legacy resources using the single file upload tool, and would employ the bulk file upload tool in the future after adapting their tracking spreadsheets to the new workflow.

In order to get a sense of staff costs, a Disability Services Specialist employed at DRES uploaded 797 books (820 files total) using the single file upload tool in the summer of 2023. These were all considered legacy items that had been digitized in recent years. The work, which was done in consultation with the library, took 100 hours to complete.

In the future, librarians and DRES staff would like to streamline this process by using bulk uploads. Bulk uploads allow resources to be submitted in batches via a spreadsheet manifest. In a manifest, rows represent items that will be submitted to EMMA and columns represent metadata elements. In future bulk uploads, DRES will use a comma-separated value file import of their spreadsheets as manifests with the intent of employing the bulk upload feature at the conclusion of each semester.

Discussion and Conclusion

Several important messages have emerged from the authors' experience developing a local deposit workflow to the EMMA repository. First, it takes commitment and concerted effort to create a successful collaboration between an institution's library and DSO. While the two are occasionally housed in the same administrative unit, this is rarely the case for many colleges and universities. There are also important differences in workplace culture. While research libraries are large organizations that usually employ dozens if not hundreds of staff, DSOs, even at large universities, rarely staff more than several individuals. This means that if decisions related to budget and staff time are fraught for libraries, they tend to be even more so in DSOs.

Second, the success of EMMA will require viable library-DSO partnerships among its member institutions. Apart from financial support through an emerging membership model, DSO and library staff need to learn how to contribute content to the EMMA system. Editing metadata, preparing file packages of digitized materials, and performing quality control on deposits takes time. DSOs and libraries must see the value in EMMA if they intend to take on additional labor to contribute to the repository and advocate on a yearly basis to maintain membership in it.

Third, if they intend to benefit from EMMA's upload tools, libraries and DSOs must commit to ongoing evaluation and refinement of the efficiency of their content management and upload workflows. As a system, EMMA provides useful tools for the ongoing upload of content, but organizations will need to adapt their systems of tracking work in order to optimize workflow. This requires that libraries and DSOs find consensus

on metadata management, quality control of uploaded content, and output reporting. In most cases, devising a workflow to facilitate the deposit of remediated files and metadata into the EMMA repository will catalyze a reconsideration of the way things are done locally and may result in conversation about streamlining future processes. Each library and DSO must invest time into building a collaborative relationship, gaining an understanding of the EMMA system, and developing a mutual commitment to a shared workflow. This includes deciding on the frequency of deposit, determining who is responsible for what tasks, and indicating how to handle the upload of new resources and legacy materials. This shared workflow may take as long as a semester to establish and a year to refine. Given the fact that the EMMA system is new and offers an evolving suite of tools for deposit, members will want to revisit their local workflows and adapt them over time to continue to improve efficiency.

Library and DSO participation in the EMMA project will evolve as the project transitions from the grant startup phase to a member-supported model, and its developers introduce system improvements. The success of the project will depend on experts in library science and disability services learning from each other's expertise. On the DSO side this will mean enhancing local work tracking and descriptive metadata practices; on the library side it will mean learning more about remediation processes and metadata. After all, librarians already know a great deal about building shared repository platforms, the law with respect to the digitization and sharing of scholarly materials, and metadata. It is time to add accessibility to this list.

Notes

1. *Authors Guild, Inc. V. HathiTrust, 755 F.3d 87 (2d Cir. 2014)*. (n.d.).
2. See *Accessibility* | www.hathitrust.org | *HathiTrust Digital Library*. (n.d.). Retrieved March 16, 2023, from https://www.hathitrust.org/accessibility
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5. Unsworth, John, and Laura C. Wood. "Repository Services for Accessible Course Content." Institute for Museum and Library Studies, 2015.
6. The grant was awarded to researchers at Tufts University, Northern Arizona University, the University of Illinois at Urbana-Champaign, the HathiTrust Digital Library, the University of Virginia, and Brandeis University. For more, read: Wood, L. C., Axelrod, J., Downie, S. J., Furlough, M., Unsworth, J., & Wedaman, D. (2017). *Libraries: Take AIM! : Accessible instructional materials and higher education* (Part of the Project "Repository Services for Accessible Course Content" Made Possible by a Grant from the Institute of Museum and Library Services). https://dl.tufts.edu/concern/pdfs/fn1079946
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