

FRAME: Federating Repositories of Accessible Materials for Higher Education

A new collaborative framework

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Abstract. Most colleges and universities offer services at their institution for students with disabilities who cannot properly utilize the standard available resources. Often the student needing the remediated resource does not obtain it until the semester is up and running, putting them significantly behind the other students in the course. This paper discusses a multi-institutional project at the University of Virginia that was established to address this problem. With a four-year grant from The Andrew W. Mellon Foundation, the University initiated an effort to create a web-based infrastructure allowing Disability Services Offices to safely share remediated texts for qualified recipients, in order to reduce their nationwide duplication of effort, and thereby make it possible for the staff in these offices to achieve better outcomes for students in higher education.

Keywords: FRAME, students with disabilities, accessible learning materials

Many books, articles, videos, and other resources are often inaccessible or not sufficiently accessible to people with perceptual, cognitive, physical, or other disabilities. A significant percentage of the population has disabilities such as blindness, low vision, dyslexia, deafness, motor impairments, and other conditions that make it difficult or impossible for them to fully perceive and consume many resources to the extent people without those disabilities can. Colleges and universities are required by law to provide accessible versions of resources that their students with these disabilities need. Unfortunately, many published resources are not yet provided by their publishers in fully-accessible forms. This requires what is known as *remediation*: acquiring a publication in some available format and altering it to make it accessible, typically for a single individual needing a particular type of remediation. For example, a blind person may need markup added to a digital resource such as a PDF or an EPUB to enable proper navigation with a screen reader, as well as providing image descriptions for images that lack them.

1. The current remediation system is costly, slow, and wasteful

Most colleges and universities have what are called Disability Services Offices (DSOs) that employ a combination of a small staff, student interns, and available software and other tools to remediate course materials and other resources each semester for the students at their institution who cannot properly consume the standard available resources. Much of this work descends on the DSO at or shortly before

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the beginning of a semester; the student needing the remediated resource often does not obtain it until the semester is well underway, putting them significantly behind the other students in the course.

The resulting remediated resource is rarely shared between DSOs, or even with other disabled students at the same institution: it was created for and only provided to a particular student at a particular university. (Most DSOs incorrectly believe that both laws and publisher requirements prohibit sharing, even within their institution.) Especially in the all-too-common case when a student at another university needs the same resource remediated in the same way, the DSO at that university will repeat the remediation work that has already been done for the student at the first university.

This is typically labor-intensive work, often done page-by-page for a book or a journal article. It involves tasks such as making tables and equations accessible, fixing incorrect heading structures, linking tables of contents or footnotes, adding image descriptions, and so forth. This same work on the same book or article could be done again and again, semester after semester, for a popular book or article at scores of colleges and universities across the country that have disabled students needing the same resource. The process is shockingly wasteful.

2. FRAME was created to address this issue

In order to facilitate the sharing of remediated resources, The Andrew W. Mellon Foundation has funded a project known as FRAME: Federating Repositories of Accessible Materials for Higher Education. FRAME's mission is to eliminate as much as possible of that wasteful, redundant work by enabling remediated resources to be discovered and shared between responsible parties.

FRAME is a collaboration between academic libraries, repositories, technologists, and DSOs. It involves libraries and DSOs at seven universities: George Mason University, the University of Illinois Champaign-Urbana, Northern Arizona University, Ohio State University, Texas A&M University, Vanderbilt University, and the University of Virginia.

It also involves the integration of three significant repositories of content useful to students at colleges and universities: Benetech's Bookshare, the Internet Archive, and the HathiTrust. In addition, a fourth repository - EMMA, Educational Materials Made Accessible - has been created at the University of Virginia for remediated materials not originating in one of those three repositories. (Currently, DSOs obtain most resources to remediate from the publishers, aggregators, or other sources - even the campus bookstore - rather than the FRAME repositories.)

At the time this is written, FRAME is also collaborating with Ace, the Accessible Content ePortal from the Ontario Council of University Libraries (OCUL), in a test of the issues involved in the sharing of content across countries that are signatories to the Marrakesh Treaty [1], who may have differing regulations and requirements regarding the dissemination of accessible materials.

FRAME's goal is to develop a unified search based on indexing the millions of resources available in the participating repositories, enabling DSOs to discover the available resources needed by their clients, and an infrastructure by which DSOs can deposit the subsequently remediated resources so that they will be discoverable and available to others.

3. The legal foundation

The need to explain the legal issues at the intersection of copyright and disability rights became clear in the earliest phase of FRAME, which was an IMLS-funded environmental scan, "Repository Services for Accessible Course Content", around the issues regarding the provision of accessible materials in higher

education. That work resulted both in an article, “Toward Accessible Course Content: Challenges and opportunities for libraries and information systems [2]”, published in the *Proceedings of the Association for Information Science and Technology* in December 2016, and an extensive white paper, “Libraries: Take AIM! Accessible Instructional Materials and Higher Education [3]”, published in March 2017. That project documented, among other things, that it is widely but incorrectly believed by DSOs that they are prevented from sharing the remediated files that they create.

To address this issue head-on, the first activity of the current Mellon-funded phases of the FRAME project was to convene a group of legal experts at the Association of Research Libraries headquarters in Washington, DC, “The Law and Accessible Texts”, in January of 2019. That meeting and the subsequent work by those experts resulted in another white paper, “Reconciling Civil Rights and Copyrights: The Law and Accessible Texts [4]”, which clearly established that it is not a violation of copyright to provide an accessible version of a resource to a person who has a disability that impairs their ability to fully consume the published version. This is based on both U.S. law (e.g., the Chafee Amendment [5]) and international law (e.g., the Marrakesh Treaty mentioned above, to which the U.S. became a signatory on February 8, 2019).

It couldn’t be clearer: DSOs are permitted to do whatever they need to do to provide properly accessible resources to qualified students and faculty; in fact, their colleges and universities are *required* to do so.

4. Priorities for phase one (2019–2020)

For practical reasons, it was decided to begin by focusing on books. Obviously, books are central to most higher education curricula. Most books are not sufficiently accessible and making them accessible is usually a significantly non-trivial task. Thus, facilitating the sharing of remediated books would provide the most benefit to DSOs and their clients.

Another reason is that the FRAME technical infrastructure is based on the Bookshare technology stack from Benetech, a leading non-profit organization devoted to accessibility. Bookshare is the most extensive collection of accessible books in the world, currently providing over a million books in any of five different accessible formats - Word, DAISY, EPUB, audio, and Braille - in addition to its online platform.

Technologists from Benetech teamed up with developers from the University of Virginia and the other participating organizations to create a unified search across all four repositories to facilitate the discovery of resources needed by the DSOs and their clients. In addition, the technical infrastructure at the University of Virginia libraries was leveraged to create the fourth repository, EMMA, for remediated resources that did not originate in one of the other three repositories.

It quickly became clear that there was no existing standard metadata for describing remediation sufficiently for FRAME. So, another early priority was developing a remediation metadata model. This was done through collaboration with the six DSOs involved in the first phase (Ohio State joined for the second phase), along with representatives from the libraries and repositories. The goal of the model was to enable precise definition of the required resource as well as information a DSO would want to know about a remediated file.

The result was a combination of identifiers, bibliographic metadata, administrative metadata, and remediation metadata:

- *Identifiers*: Parties (the DSOs and libraries), Users (the individuals using the system), Public IDs (e.g., ISBNs, DOIs), etc.

- *Bibliographic Metadata*: Title, Contributor (e.g., author, editor), Publisher, Version (e.g., edition), Publication Date, Language, etc.
- *Administrative Metadata*: Remediated By (the DSO that did the remediation), Date Submitted, Source File, Provider of Source (e.g., publisher, bookstore), etc.
- *Remediation Metadata*: Format, File Type, Features (e.g., tables, equations, images), Text Quality (e.g., OCR, rekeyed, proofread, published text), Remediation Comments (free text for the DSO to communicate information), EPUB Accessibility Metadata, etc.

To facilitate machine processing, the model provides controlled vocabularies wherever possible, based on consulting with the DSOs to determine what terms were most useful and meaningful to them.

EMMA is more than just a repository. It is also an infrastructure providing a user interface (UI) to facilitate both the discovery of available resources and the deposit of remediated resources. This required significant engineering by the UVA developer, and extensive testing and feedback by DSOs, resulting in continual refinement of the unified search and the metadata model. The result is a sophisticated user experience (UX) that provides automated lookup of bibliographic information when the user provides an ISBN or DOI, guidance on required fields vs. optional ones, and drop-downs for terms in controlled vocabularies.

5. Priorities for phase two (early 2021–early 2023)

Of course, the refinement of both the unified search and the UX for deposit of remediated resources will continue throughout Phase Two. But an additional related issue is the development and refinement of a batch upload process.

The original workflow called for a DSO to deposit a resource as soon as they had remediated it. However, we found that many would prefer to upload a batch of files at the end of a semester. And despite their previous reluctance to share files, we found that most DSOs did in fact have files that they had remediated previously. We needed to get those files into EMMA as well.

In addition, it quickly became clear that while DSOs are the experts on remediation, the libraries are the experts on metadata. So, the EMMA workflow accommodates involving both. While the UX is designed to make the input of metadata as streamlined as possible through bibliographic lookup and drop-downs of controlled vocabularies, the librarians may do the final metadata review and approval for deposited files. This is particularly helpful in the case of batch uploads, when a lot of metadata needs to be populated and where getting it right is critical, both for future users and for the repositories that are receiving remediated files of resources that came from them in the first place.

In Phase One, we adapted a process that the Internet Archive uses for batch upload. But that was not a long-range solution: it was not based on the FRAME metadata and it did not have all the functionality that we needed. So, a big priority of Phase Two is the development of a batch upload process that aligns as closely as possible with the deposit UX developed in Phase One, while minimizing the manual input of metadata. That work is underway as this article is being written.

Another Phase Two priority is to move beyond books to include journals. We expect this to be quite straightforward given the relative consistency of journal literature, compared to books. It is also part of our grant to scope out issues regarding video and audio, although we are not scoped to actually implement either of those during that phase.

We have done a survey of our participating DSOs and found that videos are indeed a big issue for them. This mainly involves captioning; many also do transcripts; few do audio descriptions (audio that

describes what is shown on the screen, for the benefit of visually-impaired people). While one DSO reported only handling fewer than ten videos annually, another one reported doing about twelve hundred to fifteen hundred. The catch: most of those videos would not be likely to be shared, because they are videos of lectures and thus are very campus-specific. Nevertheless, we are looking at ways that FRAME can be helpful to DSOs with this, since even just the captioning is a big expense. While AI-based captioning can be useful, it must be human-edited. Few DSOs do captioning in-house; most outsource the work, which can be costly.

As mentioned above, another priority for Phase Two is integrating new partners. We are in the process of bringing Ohio State University on board, which is going smoothly. We also have begun the integration of Ace, the Canadian repository, discussed above. And we have reached out to the university presses of our member universities as well. Several of them are already members of Bookshare, so their books are automatically in EMMA. But we need to make sure that the others can participate as well. We have had initial discussions about both integrating EMMA deposit into the standard file dissemination workflows of the university presses, as well as exploring whether there is a way that FRAME could help them address a big issue for them: making their backlists accessible.

6. Looking to the future of FRAME and EMMA

Three other big priorities as we wrap up Phase Two are standardizing the metadata, transitioning to a membership organization, and developing an educational program on accessibility and remediation.

Our metadata model has engendered a considerable amount of interest. Most organizations develop their own, which results in ambiguity and a lack of interoperability between organizations. We are in the process of working with NISO to set up a NISO Working Group to standardize the FRAME metadata model (with refinements as necessary based on the broad experience to be represented on that group), work that we hope will be concluded some time in 2023.

The FRAME project was never intended to benefit only the seven participating universities. Once Phase Two has been completed thanks to our Mellon grant, we need to have a membership model in place. Our goal is to establish a dues structure that recognizes the differences in resources between schools of different sizes, as well as the contributions of remediated content that they provide. Our hope is that FRAME and EMMA can be self-sustaining with a dues structure that comes close to being offset by the savings a participating university realizes by having access to already-remediated resources. Ideally, our goal is for members to come out ahead in the long run as the number of participating institutions increases and the corpus of remediated content grows.

Finally, work is ongoing at one of our participating universities, the University of Illinois Champaign-Urbana, to develop a curriculum devoted to accessibility and remediation. This will be a Masters-level course that is being piloted in the Fall of 2022 at the iSchool at Illinois. The course design is modular, so that materials can be used independently (e.g., standalone for training purposes, or integrated for formal courses). The materials will be released online under open licenses to encourage reuse. Subjects consist of general background on disability in higher education (demographics, disabilities, challenges, accommodations); explaining the work of DSOs to library school students, and vice versa; how to use the FRAME (soon NISO) metadata; understanding document formats and file formats; manual and automated techniques for remediation; the legal frameworks that apply; and potential research opportunities in the field.

It is hoped that the work done in the FRAME project, and the EMMA repository and infrastructure developed by it, will benefit DSOs across the U.S. and beyond, and especially the students who so

desperately need good accessible content in a timely manner so that they are not at a disadvantage in comparison with their classmates.

About the Author

Bill Kasdorf is an expert in accessibility, XML/HTML/EPUB modeling, information infrastructure, editorial and production workflows, and standards alignment to future proof content and systems. Past President of the Society for Scholarly Publishing (SSP), Bill is a recipient of SSP's Distinguished Service Award, the IDEAlliance/DEER Luminaire Award, and the Book Industry Study Group's Industry Champion Award.

Active in many standards initiatives, Bill is the Publishing Evangelist for the Worldwide Web Consortium (W3C); he serves on the Steering Committee of the W3C Publishing Business Group and is a member of the W3C Publishing Working Group developing the next generation of Web Publications, as well as the W3C's EPUB 3 Community Group and the EPUB 3 CG's Accessibility Task Force. He is a member of NISO, co-chairing two working groups; the Book Industry Study Group (BISG), serving on BISG's Workflow Committee; IPTC, the technical standards organization for the news media; and the DAISY Consortium, the global accessibility organization.

He is a member of the editorial board of the [Learned Publishing](#) journal and served as Guest Editor for its [January 2018 issue devoted to accessibility](#). In his consulting practice, Bill has served clients globally, including large international publishers. E-mail: kasdorf.bill@gmail.com.

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