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Brooke Wooldridge
Florida International University

Laurie Taylor
University of Florida

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Introduction

The role of digital libraries in disaster preparedness and mitigation is multifaceted. In order to properly address the topic, we are using the term "digital library" inclusively as the term to refer the structures that support digital access and preservation: digital archives, digital repositories, and related technologies and tools for digital preservation. Preservation is similarly defined in an inclusive manner, with a consideration of the overall digital supports for preservation and with preservation understood as the assurance that materials will continue to exist in something close to its original form. With this broad view of the technologies supporting preservation and preservation itself, we approach preservation from a long-term perspective where preservation is a process within the ongoing lifecycle of information and artifacts, and not as an endpoint. In order to address the role of digital libraries in disaster preparedness and mitigation, we also want to emphasize that the role is both technical and social or communal. Digital libraries, like their non-digital counterparts, utilize technology for specific purposes. The purpose for the technology defines libraries, and not the technology itself. For digital libraries, technology serves to support access and preservation as well as the communities for the digital libraries. In this paper, we review how access to library collections informs digital library technical operations. We then turn to focus on the communities surrounding digital libraries which serve as the most critical supports for disaster

preparedness and mitigation. This critical support is explained in context with several examples:

- digital library communities working to provide reference resources to assist first responders after a disaster;

- digital library communities utilizing other library communities to restore materials lost in disasters;

- new digital library communities developing in response to a disaster for disaster mitigation; and,

- new communities emerging in relation to their work on particular materials, that then seek out and connect to digital libraries in support of shared goals for disaster preparedness and mitigation.

These examples illustrate the many roles and importance of digital library communities in disaster preparedness and mitigation.

Technical Considerations

As the *Final Report of the Blue Ribbon Task Force on Sustainable Digital Preservation and Access* states, "Without preservation, there is no access." The reverse is also true for digital libraries: without access, there is no preservation. The Committee For Film Preservation and Public Access before The National Film Preservation Board of the Library of Congress notes this in speaking about film preservation, stating: "Preservation without access is pointless." For digital libraries, preservation concerns must also be access concerns because of the scale of the work involved in digital preservation.

The scale of this work creates many demands that can only be supported through supporting access. Clay Shirkey, in the *Library of Congress Archive Ingest and Handling Test (AIHT) Final Report,* explains:

> Scale is a mysterious phenomenon - processes that work fine at one scale can fail at 10 times that size, and processes that successfully handle a 10-times scale can fail at 100 times. [...] Institutions offering tools and systems for digital preservation should be careful to explain the scale(s) at which their systems have been tested, and institutions implementing such systems should ideally test them at scales far above their intended daily operation [...] to have a sense of when scaling issues are likely to appear. (Page 26)

More simply stated, "Scale changes everything" (Owens; Page 28). Digital preservation work demands access to files as a necessary part of that testing and validation for scale. Access is thus an ever-present workflow requirement. Access is required to support digital preservation as an ongoing process for the lifecycle of digital information and materials. Even for a relatively small set of materials, the work to support digital preservation is a perpetual process within the information lifecycle.

The scale of the work is measured by the quantity of materials with an infinite timeline for digital preservation processing. Because of the ongoing timeline, the scale of the work continues to grow beyond the simple quantity of materials. The unending timeline for digital preservation work must be able to adapt to technological changes. For specific technologies as they relate to the overall preservation processes for the lifecycle, see Mark Sullivan's "Digitization is Not Enough" (ACURIL 2011). In it, he similarly stresses that specific technical concerns are secondary and defined in support of digital preservation as an "active, constant process, exponentially multi-tiered, about ensuring continuing accessibility" and that it is still "relatively new and somewhat in its infancy."

Digital libraries thus perform ongoing and changing work in order to support digital preservation. Because digital libraries must continually adapt to new technologies and conduct ongoing work to support digital preservation processes, digital libraries face challenges that require a community for support.

Digital Library Communities

Digital library communities support disaster preparedness, immediate response, and mitigation. The simplest and most obvious supports are the digitization of materials as part of disaster preparedness and the restoration of preserved materials after a disaster as part of disaster mitigation. Digital library communities follow other library communities in their support of disaster preparedness and mitigation by sharing copies of materials for preservation and access. Before digital libraries shared digital copies, libraries performed this work with print copies, microfilm, and other analog formats. Digital library communities provide many less obvious supports for disaster preparedness and mitigation through their communities.

Digital libraries follow and extend traditional library supports for disasters in the manner that they:

- provide reference services and resources to assist first responders after a disaster;

- utilize library communities to restore materials lost in disasters;

- support the development of new communities to respond to disasters for disaster mitigation; and,

- support new communities that emerge based on new needs in relation to their work on particular materials and that require library collaboration to support shared goals for disaster preparedness and mitigation.

In addition to ongoing preparatory work, through sharing, disseminating, and preserving copies of materials, the digital library community provides support for the full spectrum of needs related to preparedness and mitigation. This includes support immediately following disasters, serving as a resource for the community as a whole.

Digital Library Communities and Disaster Preparedness, Response, & Mitigation

Immediately after the January 2010 earthquake in Haiti, the Federal Emergency Management Agency (FEMA) contacted the University of Florida (UF) Libraries to request copies of topographical maps of Haiti not held elsewhere. FEMA needed access to the maps for their first responders to use in Haiti. The UF Libraries immediately provided the maps and offered to provide any possible additional assistance.

The UF Libraries' holdings included these maps in the physical and digital collections because the UF Libraries have traditionally been a preservation partner for institutions throughout the Caribbean. This role in the community emerged in part because of the UF Libraries' location, which is landlocked in the middle of Florida. The location affords a degree of protection from hurricanes and storms which are of greater concern when closer to the coast. The UF Libraries embraced the preservation role, preserving materials through local holdings in print, microfilm, and digital.

The highly engaged and collaborative community to which the UF Libraries belong created the Digital Library of the Caribbean (dLOC) to meet shared preservation and access needs. In dLOC, the UF Libraries serve as the technical partner supporting the computer servers, software applications, and technical needs for digital preservation to support the community. In addition to the UF Libraries, the Florida International University (FIU) Libraries serve as the administrative host, and dLOC has over 20 additional partners. The partners "work together to preserve and provide access to enhanced electronic access to cultural, historical, legal, governmental, and research materials in a common web space with a multilingual interface" (*dLOC Fact Sheet*).

In addition to serving first responders and immediate needs following a disaster, digital library communities can provide mitigation for prior disasters. For instance, the *Windward Islands' Opinion* is a culturally and historically significant publication from St. Maarten. The archives of the *Windward Islands' Opinion* were preserved in paper in the archives in St. Maarten. The print copies of the *Windward Islands' Opinion* were lost to a fire in the publisher's collection in St. Maarten. Fortunately, the existing library communities had ensured the *Windward Islands' Opinion* was preserved through microfilm. The microfilming was conducted by the UF Libraries, with copies of the film held by both St. Maarten and the UF Libraries. While preserved, microfilm is a poor medium for local access and a very problematic medium for general access because of the need to physically use the film and because of the need to use a microfilm reader, which is specialized and not casually available equipment. Because of the historical significance of the *Windward Islands' Opinion,* it was selected for digitization through dLOC's Caribbean Newspaper Digital Library project. By digitizing this title, the digital

library community is mitigating the loss of the print materials and supporting the overall needs for preservation and access through free and open access online.

Once digitized, the *Windward Islands' Opinion* will be available online for anyone from anywhere using a computer with internet access. This free and easy access is necessary to provide full support for the materials. The materials themselves are preserved already on microfilm, but the difficulties with microfilm inhibit both preservation as an ongoing process and access. Further, the limited access hinders the preservation of contextual materials and information. In fact, OCLC's WorldCat lists the UF Libraries as the only holding institution for the *Windward Islands' Opinion* (WorldCat). Using a general web search for the *Windward Islands' Opinion* generates insufficient results in terms of quantity and quality of information given the significance of this title. The digital library community is currently digitizing this title to mitigate the prior disaster with the loss of the printed materials. The community is simultaneously working to mitigate the future disaster that would take place if the information and materials providing historical context for the title were to be lost. This loss could occur simply from the lack of recognition of their importance, which could occur as a result of a lack of access to the primary materials. Partners in dLOC have already noted that Wikipedia currently lacks a listing for the *Windward Islands' Opinion* and the community is making plans to create a Wikipedia entry once the materials are digitized to provide the prerequisite primary documentation.

After the 2010 earthquake in Haiti, the Law Library Microform Consortium (LLMC) called on its existing community to work together to provide disaster mitigation and generate new resources for future disaster preparedness. LLMC is a non-profit

cooperative of libraries that is dedicated to two core goals. The first is preserving legal titles and government documents, and the second is making the content accessible and searchable. LLMC began its work using microform and has since added digital technologies. In 2010, LLMC responded to the earthquake in Haiti by bringing together many partners to establish the LLMC *Haiti Legal Patrimony Project*. The LLMC *Haiti Legal Patrimony Project* combines the strengths of collections and resources in many law libraries around the world, locating, digitizing, and providing central access to these resources. All materials for the LLMC *Haiti Legal Patrimony Project* are available through LLMC (for subscribers with paid access) and all resources are also freely available through dLOC.

Previously, LLMC had undertaken many projects to digitize legal documents. In all of the prior projects, access was only available for paid subscribers to LLMC. With the LLMC *Haiti Legal Patrimony Project*, LLMC sought to go beyond their existing model to ensure free and full access for all in Haiti and working with Haiti following the disaster. This meant worldwide, free access was needed. As an institution, LLMC also had to support the costs for this project. In working with their community, participating libraries provided access to physical content for digitization, digitized files, and financial support. LLMC thus initiated a new project model which responded to a disaster not only to mitigate loss but to actually improve overall access to and preservation of materials. In doing so LLMC provided mitigation for the present concerns, furthered preparedness for the future, and expanded the possible models to support the overall lifecycle as a whole.

With this project, one of LLMC's goals was to build the worldwide network. As stated on the LLMC website:

> The real potential behind the Haiti Legal Patrimony Project is the opportunity to combine the scattered resources of law libraries around the world. To get that process going, over 13 libraries have agreed to sponsor the project by canvassing their collections to see if they have unique titles to contribute. (LLMC)

In working on the LLMC project, partners learned more about their own collections and about the materials themselves. The initial "master title list" included all materials that were thought to be wanted for the project. As the project continued, new entries were added to the master list each month because new materials critical to the project goals, but that were previously unknown, were discovered. Many of the items being added to the list had already been digitized. The project itself thus: digitized materials to preserve and provide access, increased access and findability for already digitized materials by locating them within a central collection, and enhanced the available contextual information about the materials which enhances the overall usability and support for understanding the materials. As with the *Windward Islands' Opinion*, the LLMC project shows the importance of curatorial work for providing the level of access necessary for immediate disaster mitigation and future preparedness. This curatorial work requires a great deal of research and effort. In fact, the curatorial work itself is recognized as a highly important and rigorous form of academic scholarship within the digital humanities. Finding materials, creating context, locating the materials together, and locating the materials within the proper context is necessary for disaster preparedness and mitigation. Digital library communities are called upon to respond and must do so as full communities in order to meet the demands for curatorial work given its complexity and sheer quantity.

In order to support disaster mitigation and preparedness, LLMC expanded their library community and project models. The Association for Cultural Equity (ACE) similarly did so for a project with the Alan Lomax recordings. Unlike LLMC, ACE began by preserving and then digitizing primary materials not held by libraries and without the initial involvement of library communities.

The ACE project for the Alan Lomax recordings is an example of how digital libraries support new communities that are initially outside of the digital library communities and that eventually become part of the digital library communities because of the need for collaboration with libraries to support shared goals for disaster preparedness and mitigation. The Alan Lomax recordings led to the emergence of ACE, which was created to support the preservation and access needs of the recordings. As the immediate needs for the materials were satisfied, new needs emerged. These new needs included the repatriation, distribution, and promotion of the materials as well as preservation and access support for secondary materials. In this case, the secondary materials are thousands of photographs taken by Alan Lomax when he was also creating the audio recordings.

Alan Lomax made his recordings in the Caribbean beginning in 1935 when Lomax sailed to the Bahamas. Lomax was supported by a budget of $198 from the Library of Congress, garnered thanks to support from Zora Neale Hurston. He traveled to Nassau, Cat Island, and Andros Island. There, he recorded sailors, sponge fishermen, farmers and dockworkers. His recordings capture African and New World styles and traditions intertwined in boat-pulling songs, shanties, anthems, and old story songs. The old story songs are a cross between Jack tales and African Anancy tales of trickster lads

outwitting the devil. One of the songs in this collection, the "John B. Sail" was a popular hit, sung by many artists including Pete Seeger, The Beach Boys, and Johnny Cash. In 1936–1937, the Library of Congress sponsored Lomax for an extensive recorded survey of Haitian music. For this collection, Lomax made fifty hours of recordings documenting early Rara, combite, children's game songs, Vaudoo, antique French ballads, and legendary composer Ludovic Lamothe (1882-1953). The audio recordings for this collection are accompanied by archival materials: a diary, correspondence chronicling the trip, diagrams, drawings, and film footage. These rich resources were unavailable and in danger for 70 years before ACE reformatted and restored the recordings.

In 1962, the Rockefeller Foundation provided funding and the University of the West Indies provided sponsorship for Lomax to record the music of the Lesser Antilles. During this six month project, Lomax made 1,859 field recordings and 1,093 documentary photographs. This collection features recordings and photographs from twelve islands, including: Anguilla, Dominica, Carriacou, Grenada, Guadeloupe, Martinique, St. Barthelemy, St. Kitts and Nevis, St. Lucia, and Trinidad and Tobago. Later in the decade, Lomax made recordings in St. Eustatius and the Dominican Republic.

Lomax's many thousands of recordings and photographs required reformatting for preservation and access. ACE provided the necessary support for this work. With the materials reformatted for preservation, providing access was the next step. Because the Lomax recordings and photographs were made as field research, the people captured for posterity did not grant permissions for their work or likeness to be used in any sort of wide manner. Further complicating the situation is that these recordings capture not only

the work of individual artists, but also the work and heritage of different cultures with the folk tales and traditional music. In order to provide general access, ACE first had to provide access to the countries of origin and patrimony. ACE identified collaborative partners to facilitate repatriation across the Caribbean. In the case of Haiti, ACE worked with the Green Family Foundation to repatriate copies of recordings to the country of originand to promote the recordings as resources locally. In April 2010, members of the Green Family Foundation and ACE traveled to Haiti to initiate repatriation of Lomax's Haiti recordings and widespread outreach that so far has reached over 250,000 people.

The Green Family Foundation is also supporting a dLOC project for an online exhibit on Haiti's history entitled "Haiti: An Island Luminous." The Green Family Foundation served as a collaborative bridge to connect ACE and dLOC. While some of the Lomax recordings have been repatriated, more remain and are in process. . ACE also needed to find a method for supporting online access to the photographs because their site was designed to support the recordings as the primary goal, with the photographs as a future concern. While the Lomax recordings did not begin with a digital library community, ACE joined the dLOC community and the two are collaborating to share the Lomax photographs openly online, promote the Lomax recordings, and conduct outreach to artists and their heirs to further share the recordings that are rich examples of cultural heritage and individual artistic work. The evolution of the Lomax project shows how digital library communities can aid in disaster preparedness and mitigation for existing projects that originate outside of library communities.

Conclusion

In digital libraries, technology is always in service of the overall goals which include preservation and access. Because of the scale of digital library work and the evolving technologies in use, digital libraries are best defined by the shared goals of their communities as they work together. For disaster response, digital libraries have continued and expanded upon traditional library roles. Digital libraries have developed new project models and new collaborations. Further, digital libraries continue to develop new methods and means to support preservation and access as part of the ongoing support for the lifecycle of information. In doing so, digital library communities are active participants in all aspects of disaster preparedness, mitigation, and the development of new ideas to better support the entire process. Many digital library communities also provide information resources on the role of libraries in disaster preparedness and mitigation, as with Caribbean Disaster Information Network (CARDIN) and dLOC.

Existing needs include supporting both the preservation and access. The needs related to access are not yet fully defined. For instance, the Lomax project is particularly striking because its materials were in danger of being lost through the disaster of being unknown. Digital library communities serve a pivotal role in disaster preparedness and mitigation for both commonly considered disasters and the unexpected disasters that will occur from neglect and a lack of remembering. The Lomax recordings could have been lost, despite their status as cultural treasures, from a lack of knowledge about the recordings. The role of digital library communities in curatorial work will continue to expand. For materials in need of preservation, all too often their histories need to be found and documented. This contextual information provides the necessary means for understanding and using the primary documents. Without the historical context and

supports, the materials can be rendered inaccessible from the lack of connection, even if the primary materials are openly and freely available online. Digital library communities provide the libraries in their communities with needed connections and supports so, too, must digital libraries provide connections and supports for the primary materials they contain.

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