Going Beyond Availability: Truly Accessible Research Data

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INTRODUCTION

In 2012 "the Alliance for Disability and Students at the University of Montana—ADSUM —filed a complaint with the U.S. Department of Education alleging [that] students … who have disabilities face discrimination at UM" (Szpaller, 2012, para. 4). Two years later, the President of the University of Montana (UM) signed a resolution agreement with the U.S. Department of Education, Office for Civil Rights (UM/OCR resolution agreement, 2014). This resolution agreement focuses heavily on the accessibility of electronic and information technology for individuals with disabilities and outlines action strategies for remediating all UM websites, learning management systems, library services, and classrooms. This agreement represents a trend towards stricter enforcement of accessibility legislation in the higher education arena (Grossman, 2014).

As librarians who are involved in nascent data management services at UM, we began thinking about how this agreement affects the creation, documentation, publication, and curation of research data on our campus. As we attempted to locate answers to our many questions around accessible—not just available—data, we learned that not many answers exist and that there is a huge opportunity for education and conversation around this topic.

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We decided to write this paper in order to make a distinction between shared data that is available and shared data that is both available and accessible, to introduce some basic accessibility concepts, and to share our ideas and thoughts about possible considerations by and training for academic stakeholders involved with research data. We still do not have all the answers, but we hope that starting this conversation will help encourage a larger community of librarians and researchers to begin developing solutions together.

DATA AND SCHOLARLY COMMUNICATION

Of course, initiatives to address other aspects of accessible data, such as online availability, are already well underway. As early as 2003, the National Institutes of Health stated that "Data should be made as widely and freely available as possible" (NIH, 2003, Goals of Data Sharing section). Since 2003, we have seen a number of federal granting agencies require data sharing, including the National Science Foundation, the Institute of Education Sciences (U.S. Department of Education), and the National Oceanic and Atmospheric Administration.

A number of other agencies encourage data sharing and at the very least, require data management plans. Documents such as the "Denton Declaration: An Open Data Manifesto" (Keralis, 2012) put forth basic principles and intentions for open data, and an ever-growing number of society and commercial journal publishers also actively support and sometimes require data sharing.

These movements toward data sharing underlie a shift in recognition that data itself is a valuable, preservation- and share-worthy component of the scholarly record (Lavoie et al., 2014), with proponents arguing that shared data can:

- be used to validate and advance scientific methods and research (Borgman, 2012);
- increase the social and economic impact of research (Open Knowledge Foundation, 2012b); and
- increase citations (Piwowar and Vision, 2013).

Given these and other benefits, shared research data has the potential to advance "science, scholarship and society" (Keralis, 2012). However, this potential becomes limited when research data is merely made openly available rather than truly accessible.

ACCESSIBILITY AND LIBRARIES

Legislation such as 1990's Americans with Disabilities Act (ADA), Section 504 of the Rehabilitation Act of 1973, and Section 508 of the Rehabilitation Act require higher

education institutions and federally funded organizations to make their resources, services, programs, activities, and facilities available and accessible to patrons with disabilities (WebAIM, 2013). The ADA also requires covered employers to provide reasonable accommodations to employees with disabilities and imposes accessibility requirements on public spaces. Accessibility requirements apply in both physical and online environments and therefore are applicable to more recently emerging activities such as data sharing.

Libraries have a long history of supporting access, so in some ways it is surprising to see them being pulled into various accessibility-related lawsuits across the country. In addition to the library at UM, libraries at Pennsylvania State University (California State University, 2009a) and at the University of California, Berkeley (California State University, 2009b) were specifically named in settlements resulting from cases brought forward on behalf of students at those institutions. However, despite the fact that library services have historically been described around the concept of accessibility, library and information professionals have continued to follow a somewhat narrow definition of the term "accessible." Transitions from card catalogs to OPACs and increasing collections of electronic journals and digital collections are marketed as making the library's collections more accessible, and they have done so to a point. However, the definition of that term has historically aligned more closely with the meaning of available rather than accessible. It is important for us to move beyond the narrow definitions; rather than focusing on access to specific communities or individuals, we need to start thinking about access for everyone. This philosophy is very much in line with the goals of those encouraging data sharing.

For instance, the Open Data Handbook from the Open Knowledge Foundation Project contains a particularly useful definition of Open Data that includes "Universal Participation: everyone must be able to use, reuse and redistribute—there should be no discrimination against fields of endeavor or against persons or groups" (Open Knowledge Foundation, 2012a). As the Office for Civil Rights becomes more aggressive about identifying institutions that fail to comply with federal accessibility requirements (Grossman, 2014), and as the push to share data and make it openly available continues, we should be thinking more intently about what "universal participation" in data sharing really means and how to achieve it.

ACCESSIBILITY AND SHARED DATA

Accessibility lawsuit outcomes provide libraries with an opportunity to assume a leading role in creating a culture shift that embeds the idea of access and usability into everyday design and delivery principles. The concepts of access, usability, accessibility, and Universal Design are not new; however, they are often considered and discussed separately rather than

as a comprehensive approach. Just as Universal Design is becoming commonplace in web development, design, and architecture, it can and should be embedded into new emerging library services as well.

Shared data and data management activities and services are prime candidates for a new, more comprehensive approach to accessibility in part because, as the call for papers for this issue of the *Journal of Librarianship and Scholarly Communication* states, "the world of data lacks the ingrained standards and practices the library and academic community have built up over the years" (Clement & Schiff, 2015). Now is the time to integrate accessibility standards and best practices into the research data lifecycle in order to truly "realize the vision of treating research data (i.e. data intentionally generated or examined for the purposes of scholarly analysis) as a first class object of scholarly communication" (Clement & Schiff, 2015).

CONSIDERATIONS FOR INSTITUTIONS, RESEARCHERS/FACULTY, AND LIBRARIANS

In terms of truly accessible data, institutions, researchers, teaching faculty, and librarians should consider the following ideas. This section is by no means comprehensive and does not offer answers to the many questions around this challenging topic. We present these ideas in an effort to help initiate conversations and collaborative explorations for solutions.

Institutions: Ideally, accessibility is a primary topic of discussion and interest at the institutional level, and campus leaders support accessibility both in spirt and in practice by following best practices in Universal Design in both physical locations and online. Campus IT departments need to be aware of and adhere to the latest version of the Worldwide Web Consortium's (2008) Web Content Accessibility Guidelines (WCAG). When libraries and campus IT departments provide platforms for open access data, both the platform and the data need to be technically and functionally accessible, not just available.

Similarly, course and learning management systems, which may provide students with access to materials and assignments that include datasets or data visualizations such as charts and graphs, should also be accessible. At UM, we use Moodle, and staff members have been working with the Moodle community to improve the accessibility of the system and with faculty to improve the accessibility of the course materials available via Moodle (Pace, 2015).

Researchers and teaching faculty: Researchers do a lot of things with their data. They create, collect, organize, describe, archive, and share it. It behooves researchers to think and learn about accessibility at the outset of the research data lifecycle so that they can make sure that the process of data creation, organization, and presentation results in accessible data for students, researchers, and citizens who use it and who many want to re-use it. We

recognize that this idea, in particular, presents many challenges. Many different types of data are generated in different forms with different kinds of technologies across disciplines, so there is no "one size fits all" solution for data producers. However, even basic steps, such as learning how to create accessible tables and spreadsheets, how to craft descriptive metadata for maximum understandability, or how to use built-in style features in word processing software to create an accessible data management plan document, can go a long way towards making data accessible.

Teaching faculty who use charts, graphs, and other visual aids to represent data should also make the raw data upon which those visual aids are based available to their students. A visually-impaired student may not be able to view a pie chart, but they can use assistive technology to navigate a properly formatted and labeled table containing the underlying data.

Librarians who support data management: As librarians increasingly become involved in providing support for data management across campuses, they are well-placed to provide guidance on how to integrate accessibility principles throughout the research data management lifecycle. Consider, for example, that metadata, when applied consistently and according to best practices, can become rich alternative text for users of assistive technology while serving the traditional purpose of providing the "data about the data." Librarians may need to brush up on their accessibility-related knowledge as discovery and delivery portals, platforms, and repositories; the tools and software used to create and manage research data; documents and spreadsheets; data outputs; and metadata all require slightly different applications of WCAG and Universal Design principles in order to be truly accessible. Librarians may also want to establish partnerships with or more fully utilize existing relationships with disabilities services staff on campus.

TRAINING

Addressing barriers to access and embedding universal design principles into existing services can feel overwhelming. In addition to the technological specifications, it is important to consider usefulness and usability of a resource or service. Add to that the variety of assistive technologies available, the various user skills, and the resources necessary for implementation compared to the resources available, and this can all feel like a daunting task. Luckily, there are a growing number of excellent, free resources available to help you get started. A few of these include:

WebAIM (http://webaim.org/): a non-profit organization operating out of the Center for Persons with Disabilities at Utah State University. In addition to developing and retrofitting

web content for accessibility, they provide training, resources, and tools for creating and evaluating accessible web content (WebAIM, 2015).

The Center for Universal Design (http://www.ncsu.edu/ncsu/design/cud/): a research and technical assistance center that promotes accessible housing, buildings, and related products. Their website provides information about resources and training for utilizing universal design principles (North Carolina State University, 2008).

Diagram Center (http://diagramcenter.org/): a research and development center specializing in creating accessible image and graphic content for students with print disabilities. Their webpage provides information about standards, tools, and training resources (Diagram Center, n.d.).

California State University Accessible Technology Initiative (http://www.calstate. edu/accessibility/tutorials/math.shtml): This website provides tips and tutorials to assist with creating accessible math content (California State University, n.d., How do I create accessible math content? section).

CONCLUSION

It is relatively easy to rally behind accessibility-related efforts and activities because it is the "right thing to do." In practice, it doesn't take long to come up against some real challenges, including time, knowledge, and technology-based limitations. The road to electronic accessibility, in particular, is a long and iterative one. And in the shared data and data management arena, there are and will be many unanswered questions and complications related to propriety software, file formats and outputs, and the sheer breadth and depth of the kinds of research data that are generated across disciplines. But keep in mind that no one expects everything to be accessible overnight. This statement from David A. Kennedy (2014, para. 6) provides important perspective:

> Accessibility is a design constraint. Treat it like one. I don't mean that in a negative way, but in the sense that a constraint forces us to push boundaries and think ahead…I need to see accessibility for what it is too. That means, like everything else on the Web, I need to embrace its fluidity. It can't be perfect, but it can improve incrementally with each release. Better than before is always better than perfect.

We encourage you to start taking the steps now to learn about accessibility and Universal Design principles. Develop policies, support, and training services for faculty and graduate students that lead to incremental steps towards making your services, processes, content,

and outcomes as inclusive as possible in terms of access. A good faith effort, which begins with knowledge and legitimate attempts towards these goals, goes a long way.

As of May 2015, the United States Access Board is proposing a refresh of the Section 508 Standards and Section 255 Guidelines for information and communication technology "so that they adequately address accessibility and keep pace with the ever-changing nature of the technologies covered" (United States Access Board, 2015, Goals of the Refresh section). The technologies covered include "electronic and information technology developed, procured, maintained, or used by federal agencies" (United States Access Board, 2015, Technologies Covered section). Given this federal-level spotlight on accessibility, we cannot help but wonder if is only a matter of time before accessibility becomes an explicit, formal requirement for all federally funded research outputs. Conversations around standards and best practices related to shared data and research data management are still emerging. Let's be proactive, not just reactive, and start thinking and talking now about how to make research data both available and accessible.

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