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A survey of non-academic archival repositories revealed that a majority of respondents are using digital asset management systems (DAMS) to manage digitized material. However, considering the barriers to DAMS use and the complexity of managing digitized content, DAMS is not a comprehensive solution for managing records, nor is there a clear replacement for DAMS. Lack of institutional support is identified as a main impediment to digital asset management and DAMS implementation, pointing to the importance of advocacy for digital asset management.

Headings:

Digital Asset Management

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“THE MESS IS THERE”: DIGITAL ASSET MANAGEMENT
SYSTEM USE IN NON-ACADEMIC ARCHIVAL REPOSITORIES

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Introduction

Since the 1990s, digitization has been hailed as a main component of maintaining relevance in archival repositories: digitizing analog material can make it more accessible, discoverable, and usable. However, growing digital collections demand higher levels of maintenance and investment when ensuring the authenticity, understandability, usability, and integrity of material. Digital asset management systems (DAMS) are a common solution to managing digitized material because of their high level of functionality, but given the lack of resources that non-academic repositories in particular face, this paper explores what archivists in these settings perceive as the greatest impediments to digital asset management, and systems these repositories employ in lieu of or in support of DAM systems.

Literature Review

Relevance of Archival Repositories in a Digital Age

In an environment where users increasingly expect to be able to access information at the click of a button, traditional archival repositories of analog material are under pressure to redefine their relevance. Maintaining relevance is “an ongoing battle [among] history-based enterprises, especially in times of financial turmoil when only ‘essential’ services seem to survive budget cuts” (Fox 57). For that reason, it is not enough to rely on

uniqueness or rarity of collection holdings to guarantee the viability, visibility, and value of a repository. While collections certainly remain a “rich supply of unique, rare, and primary sources from which new knowledge, dynamic discovery, and intense learning experience can be generated,” increasingly archivists face environments where it is not enough to “simply assume value” (Carter 89). The problem of relevance boils down to a simple argument: “if [collections] are not accessible, they are not used; if they are not used, they may go away. Neglect can lead to obsolescence” (Erway). The essential question surrounding repositories of unique holdings has become, “while our special collections and archives may have inherent value based on their rarity or uniqueness, how can we prove they have relevance in today’s research, teaching, and learning environments?”

(Carter 91).

Digitization: The Promise

Proving relevance depends in part on demonstrating value through increased visibility of collections not only to potential patrons, but also to the repository’s parent institution should one exist, to institutions that could act as collaborative partners, and of course to funding organizations. For about two decades, one part of the solution of creating and maintaining relevance has been to increase the digital accessibility of what had been accessible only as physical, on-site material (Carter 90). Many repositories assert that in difficult financial times, demonstrating value through visible means is “integral to receiving funding, and digitization plays a key role in this endeavor” (Kupfer 9).

Simply defined, digitization is “the transfer of analog items, like documents or photographs, into digital form for electronic access and use” (Miller 199). Digitization is also much more than that single act, as it is also the activities that surround the transfer from analog to digital formats, including the “management of [...] resources, selection and preparation of materials and their digital conversion, organization, storage and provision of access to digital surrogates” (Manžuch 771).

Digitization should serve to “protect originals”, “represent originals” by capturing the complete content of the originals, and ultimately “transcend originals” through added-value features (Sitts 10). Digitization projects also necessitate a rethinking of traditional archival principles. The requirements of digital objects, and the limitations and capabilities of digital systems transform the practices by which the principles of collection longevity, selection, quality, integrity, and access are upheld. Longevity becomes a question of the life expectancy of the access system and storage media rather than that of organic material, and because of the cost involved with digitization, selection is determined by which objects are deemed fit for digitization. Some traditional archival principles can be advanced through digitization, as quality of material is by image enhancement and deep zoom; as integrity is by authentication procedures; and as access is through the possibility for remote access to material, features like optical character recognition, and enhanced browsing capabilities (12-18).

Digitization can open the repository and its collection up to new possibilities around access and preservation. Collections that have high research potential, but which were previously inaccessible to large populations, can find a potentially global audience, as digitizing and presenting collections online “removes some of the geographical

barriers to access that hinder the efforts of many researchers” (Fox 58). Material that was once found only by serendipity or by hours of diligent sorting through documents can be discovered through powerful search capabilities and metadata records. In a 2009 survey of digitization activities, the most popular objective of digitization programs identified among surveyed repositories was “access.” Although “raising awareness about institutions and their collections” was offered the least as an objective of digitization, it stands to reason that building awareness – that is, building a case for relevance – is a natural byproduct of enhanced access to collections via digitization (Manžuch 781).

A second argument regularly made to bolster the case for digitization is that the process can serve preservation objectives. Once material is digitized, it slows the deterioration of the originals as the physical material no longer has to be frequently removed from protective casings to be handled by researchers and archive staff (Miller 199).

Because of the accessibility and preservation benefits digitization affords, such projects can help institutions to meet organizational missions, creating relevance internally within the institution (McGovern 238). A 2011 assessment of a medical archive’s digitization program found that the program contributed to building the repository’s relevance to a much wider set of stakeholders. The program increased the repository’s value through “a successful marriage of archival stewardship, digital accessibility, and public relations” (Fox 57). Digitization “demonstrated [to the parent institution] that these historical materials could be employed for present-day use, for example by alumni and development officers.” It showed that their records not only served a historical purpose, but also a public relations purpose. Furthermore, “increased

grant funding has been one of the most tangible outcomes of this project. Because of the demonstrable success of its projects beginning [...] in 2006, the [institution] secured additional grants to fund other digitization partnerships” (59). By making its collections relevant to multiple stakeholders through digitization, the archive made itself relevant.

Digitization: The Problem

All of this added value comes at a price. Digitization is a time-consuming and costly enterprise, requiring archivists to reach out to new stakeholders, create new workflows, and implement new, complex, expensive systems. Beyond the costs of storage and personnel, the upkeep of digitization programs and digital objects can be detrimental to sound implementation and sustainability. Just as the digitization of records can assist with the preservation of analog material, it can also necessitate the adoption of digital preservation practices as digital objects are more “susceptible to damage or loss, given the speed with which technologies become obsolete” (Miller 199). If stakeholders are to invest the same level of trust in digital objects as they do in their analog counterparts, then repositories must also invest in an accompanying “suite of [digital preservation] tools, operations, standards, and policies that help ensure that the investment [in digitization] is not squandered” (Conway 65).

Digitization becomes further complicated with the introduction of collaborative digitization projects that involve many institutions. While institutional partnerships are enticing because they can expand the audience for collections and introduce efficiencies of scale, such partnerships can also open up new problems, like the difficulty of

managing storage space and “lack of uniformity in metadata creation caused, in part, by disparate workflows” (Kupfer 44).

All of these challenges – “technology obsolescence, necessity for long-term investments into management of digitization and digitized collections, interoperability between different systems” – point to the importance of treating “digitization as a long-term initiative [...] requiring strategic management” (Manžuch 771). Such an approach may cover everything from project planning, risk management, defining target population, establishing partnerships, determining costs, and implementing technological solutions

Institutionalization of Digitization: From Projects to Programs

Despite the challenges of digitization, the benefits of digitization have long made it a worthwhile endeavor. Stuart Lee has called the 1990s the “decade of digitization.” In 1999, Gould and Ebdon noted “that nearly two-thirds of the libraries they surveyed had a digitization research program and operation, the majority having started as far back as 1995-96” (Lee 4). The practice is now routine in many archives, libraries, and museums, and the digital images that resulted from small, often ad hoc, projects have now reached a critical mass of digitized objects that “need to be reassessed and institutionalized if the resulting digital assets are to survive” (Yakel 102).

For that reason, in 2004 Elizabeth Yakel called for moving from thinking of the digital images that are produced during digitization no longer just as “digital objects,” but as “digital assets.” This “reconceptualization is important because it implies a larger interest (and investment) in the digitized materials which should be accompanied by the

recognition that the long-term value of the assets resides in the ability to repurpose them for different uses, audiences, and situations” (103). Such a mindset requires that repositories build the capacity for institutional infrastructure “that goes beyond the temporary structures created for any individual project,” including “policy development, technology, funding, expertise, and long-term commitment” (102-103). In sum, “it is widely accepted that digitization is not merely a technical process but a set of strategic, resource management, financial and other solutions and actions that contribute to fulfilling the mission of memory institutions” (Manžuch 790).

Digital Assets Management as a Solution

To assist with the strategic, intentional management of the influx of digitized material, archivists are turning to software solutions, which coupled with the practices described above, are fundamental to ensuring the safe long-term management of digitized collections. Digital assets management (DAM) systems are a common choice among repositories to meet the challenges introduced by digitized material (Zamon 43). These systems are capable of supporting “the acquisition, description, tracking, discovery, retrieval, searching, and distribution of collections of digital objects” (Society of American Archivists Glossary). Such systems do not allow content to be web-enabled by themselves, but they can function with web-facing technology, like content management software (Zamon 45). If digital assets need to be made available to users outside of internal staff, “a separate discovery and access system that allows an end user to browse or search the collection and retrieve images” may be required (Edlund 5).

Because of the expense and complexity of implementing a DAM system,

implementation encourages repositories to develop a comprehensive strategy plan that “considers not only the technical component of how to store a digitized record within a DAM system, but also administrative principles and purpose, the needs of stakeholders, as well as policies covering intellectual property, collection development, technical specifications, and metadata” (McGovern 237). Because of the comprehensive nature of these systems and the planning that accompanies system implementation, “creating a digital asset management strategy plan is a key way to help an institution maintain relevance in an increasingly digital world” (253).

Digital Assets Management in Non-Academic Settings

In 2004, Liz Bishoff noted that “planning for digital asset management programs is part of a trend leading to the inclusion of digital resource management in the core functions of cultural heritage organizations.” She commented on the trend of larger organizations, such as universities, moving toward the regular assignment of operating funds to comprehensive digital asset management solutions. She went on to predict that over time, as repository patrons increasingly expect digital services, smaller, non-academic institutions “may be more likely to consider digital asset programs as vital to the success of educational services, information literacy, and other programs” (28).

Within the same period, some have argued that the costs associated with digitization programs have resulted in “new special collections, which, like its traditional counterpart, [are] very expensive and will be warranted for only a small, selected subset of publications” (Erway). This core limitation of digitization has caused some to propose that the true value of digitization lies solely in providing access to material – the more

material, the better – even if the quality of the digitized objects or systems for accessing the objects suffers. Influenced by projects like Google’s mass digitization of books, Ricky Erway offered the provocative argument that like many analog collections, digitized collections should also receive the “more product, less process” treatment. That is, he argues, “it is time to think about digitization in terms of access and begin to unlock our collections [by] [setting] the digital copies free.” This shift in “scanning for preservation to scanning for access” would make more content available, even if “recommendations for high quality practices and standards” go by the wayside. Assuming that some digitization is better than no digitization, this short-term fix is certainly one many institutions subscribe to, lacking the resources to implement more strategic, holistic solutions, like DAM systems.

Methodology

The purpose of this study is to explore the extent to which organizations that often lack the institutional support of universities are building the capacity to support holistic, integrative solutions like DAM systems, or if digitized projects remain in the province of simpler software solutions that were not specifically designed to manage digital assets. This paper reports the results of a survey of archivists. Participants were recruited through an announcement to the Society of American Archivists’ listserv, Archives and Archivists. Archivists who work in non-academic repositories that digitize material were invited to participate. “Non-academic” repositories were defined as cultural/historic, government, museum, private/corporate, personal, scientific, or other institutions not associated with an academic parent institution. Repositories that were identified as

“other” included repositories that serve public libraries, religious organizations, educational organizations, hospitals, and non-profits. The survey was administered using Qualtrics. A follow-up email requesting participation was sent one week after the initial request.

The survey instrument asked about three key aspects of DAM system use: whether the respondent’s repository is or is not employing a DAM system; for those that do not use a DAM system, what the respondents’ greatest perceived barriers to its use are; and what other software solutions respondents are using in lieu of or supplementary to a DAM system. See Appendix A for the full text of the survey instrument.

To ensure that all respondents approached this survey with a common understanding of the terms used, operational definitions for “digital assets management system” and “content management system” (which because of overlapping functionality may be confused with a DAM system) were provided at the beginning of the survey. These definitions are provided below.

Definition of Terms

Digital Assets Management System

A **digital assets management system** (DAMS) provides a stable and persistent environment for managing large amounts of digital data, particularly archival-quality high-resolution multi-media files like images, video, and audio. A DAMS serves as a centralized access point for managing collections and workflow, and is dedicated to supporting tasks associated with the acquisition, storing, ingesting,

indexing, cataloguing, search, discovery, and retrieval of digital objects. A DAMS may also support security and digital rights management, robust semantic metadata and standards-based metadata schema, metadata extraction, access and administrative rights, version control and activity logs, and annotation and collaboration activities. As a repository's digital assets are created for preservation in addition to discovery purposes, the system's primary purpose is not to display digital assets online, although a DAMS may have a discovery layer that makes this possible.

Popular DAMSs include: Adobe Lightroom, Artesia, Canto Cumulus, ContentDM, DSpace, Ex Libris Rosetta, Extensis Portfolio, Fedora, Notre DAM, Nuxeo DAM/DM, and ResourceSpace.

Content Management System

A **content management system** (CMS) is primarily a system manager for websites and intranets, used for creating, managing, and publishing content in real time. An **enterprise content management system** manages an enterprise's information, including operational documents and organizational data. A **web content management system** is used to manage a website's content and images, often employing blogging platforms. Increasingly there is more overlap between the functions of a CMS and a DAMS, but a CMS is generally used to manage relatively small numbers of images and videos, often through a media library, and may provide only limited options in terms of rights management, version control, advanced search, and robust semantic metadata support.

Popular enterprise content management systems include: Sharepoint and
Alfresco

Popular web content management systems include: Drupal, Joomla!, and
WordPress

Findings

This survey collected responses from a total of 50 non-academic archival repositories.

Survey respondents were allowed to choose multiple options when identifying as a type of repository.

Figure 1: Survey Respondents by Repository Type and Percentage of Collection Digitized

Repository Type	N	Percent of Collections Digitized	
		1-25%	26-50%
Cultural/Historic	18	16	2
Government	11	10	1
Museum	12	11	1
Private/Corporate	15	13	2
Personal	1	1	-
Scientific	3	2	1
Other*	13	11	2
Total	50	44	6

*Other includes repositories that serve public libraries, religious organizations, educational organizations, hospitals, and non-profits

Use of Digital Assets Management Systems

A majority of respondents indicated that their repositories use DAM systems to manage their digitized material (32 out of 50, or 64%). Figure 2 displays the frequency with which survey respondents report using DAMS to manage their repository's digital assets, arranged by repository type.

Figure 2: DAMS Use by Repository Type

Repository Type	32	64%	of total respondents
Cultural/Historic	12	67%	of repositories identified as cultural/historic
Government	7	64%	of repositories identified as government
Museum	6	50%	of repositories identified as museum
Private/Corporate	9	60%	of repositories identified as private/corporate
Personal	0	0%	of repositories identified as personal
Scientific	1	33%	of repositories identified as scientific
Other	9	69%	of repositories identified as "other"

Use of DAMS in Conjunction with Other Systems

The use of a DAM system does not preclude the use of other software solutions in managing digital assets. 94% (n=47) of all respondents reported relying on at least one other system to manage digitized assets, regardless of whether or not the repository uses a DAM system.

Figure 3 shows the types of other software solutions survey respondents reported using to manage their digital assets. Fisher's exact test for small sample sizes was used to determine the statistical significance in supplementary software use between repositories

that do and do not employ a DAM system. There is no statistically significant difference in any category of system use between DAM system users and repositories that do not employ a DAM system. This suggests that a DAM system is not a comprehensive system for managing digital assets as DAM system users rely on a multitude of other software systems, and there is no clear software solution that replaces the use of a DAM system among repositories that do not employ a DAM system.

Figure 3: Other Systems Used to Manage Digitized Material

	Use DAMS (n=32)		Do not use DAMS (n=18)		p-value
	n	%	n	%	
File manager	18	56.3%	12	66.7%	0.56
Image browser	5	15.6%	3	16.7%	1.00
Web CMS	5	15.6%	5	27.8%	0.46
Enterprise CMS	5	15.6%	3	16.7%	1.00
Institutional Repository	8	25.0%	1	5.6%	0.13
Archival management software	6	18.8%	6	33.3%	0.31
Other	7	21.9%	4	22.2%	1.00

The above table does not take into consideration that repositories may rely on a combination of solutions to manage their digital assets. In fact, on average, respondents reported employing 1.78 systems other than DAMS to manage digital assets. There is very little difference in the number of supplementary systems respondents report using between repositories that use DAM systems and those that do not: DAM system users report employing an average of 1.75 systems in addition to a DAM system, while non-DAMS users report using 1.83 systems. In total, respondents identified 23 unique combinations of system configurations, no single combination clearly prevailing as the most prominent configuration. Figure 4 below shows the most common solution

combinations reported by respondents whose repositories do and do not use DAM systems.

Figure 4: Most Common Solution Combinations

	In Support of DAMS (n=32)		In Lieu of DAMS (n=18)		Total Number of Repositories	
	n	%	n	%	n	%
File manager only	5	15.6%	3	16.7%	8	16%
File manager and archival management software	4	12.5%	3	16.7%	7	14%
Institutional repository only	5	15.6%	0	-	5	10%
File manager and enterprise CMS	2	6.3%	1	5.6%	3	6%
None	2	6.3%	1	5.6%	3	6%
File manager and web CMS	0	-	2	11.1%	2	4%

Similarly, if non-DAM system solutions are classified as “complex” or “simple”, no significant difference exists between repositories that do and do not use a DAM system. Those considered “complex” systems are resource-intensive, specialty software (content management systems, institutional repositories, archival management systems), while applications native to the operating system or that do not require high levels of resources or training to implement are classified as “simple” solutions (file managers, image browsers, and spreadsheets or simple database applications). This classification system is shown in Figure 5.

Figure 5: Non-DAMS Solution Use Coded as “Simple” or “Complex”

	Use DAMS (n=32)		Do not use DAMS (n=18)		p-value
	n	%	n	%	
Simple software solution(s) only	7	22%	5	28%	0.73
Sophisticated software solution(s) only	10	31%	4	22%	0.74
Combination of simple and sophisticated solutions	12	38%	8	44%	0.77
None	2	11%	1	6%	1.00
Unidentified	1	3%	0	-	1.00

Barriers to DAMS Use

Respondents whose institutions do not employ DAM systems were asked about the greatest perceived barriers to implementing such a system. Survey responses indicating how respondents rank barriers to DAM system use are shown in Figure 6.

Figure 6: Greatest Barriers to DAM System Use

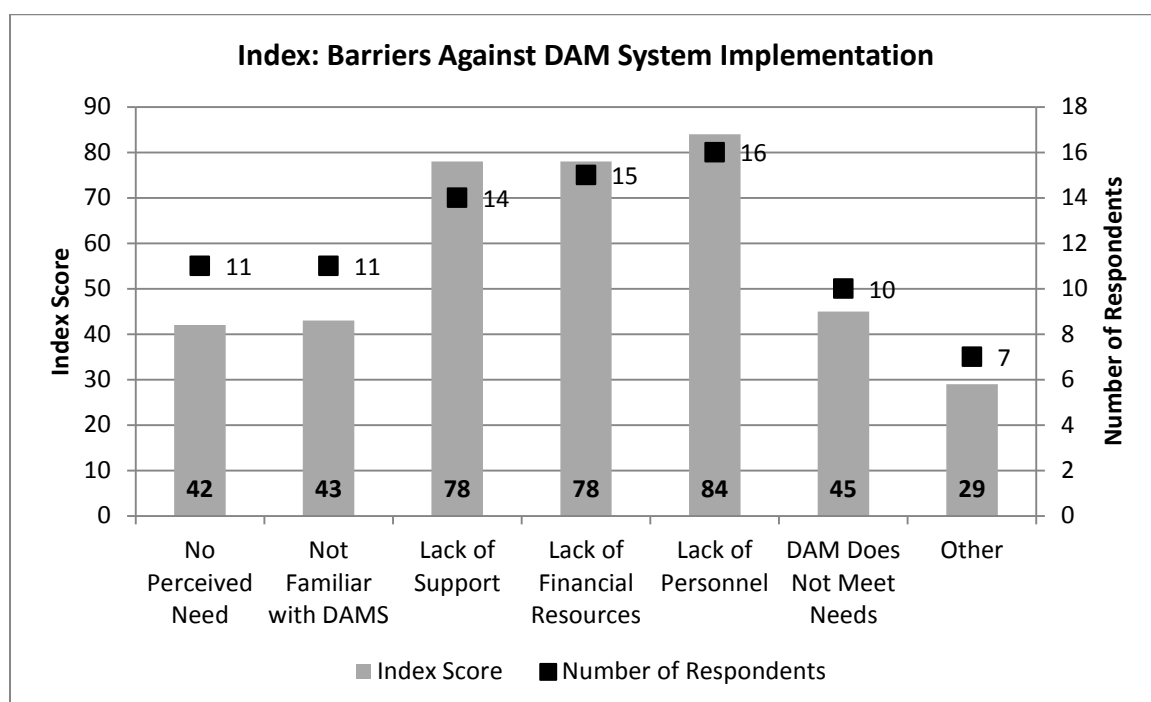
Why does your repository not use a digital asset management system? Rank the following options from 1 (most significant barrier to DAMS use) to 7 (least significant barrier). If an option does not apply, you may leave it blank.								
	Greatest Barrier 1	2	3	4	5	6	7	Not a barrier (no response)
No perceived need	2 11.1%	2 11.1%	0 0%	2 11.1%	1 5.6%	1 16.7%	3 16.7%	7 38.9%
Not familiar with DAMS	2 11.1%	1 5.6%	1 5.6%	2 11.1%	1 5.6%	3 16.7%	0 0%	8 44.4%
Lack of institutional support	5 27.8%	4 22.2%	2 11.1%	1 5.6%	1 5.6%	1 5.6%	0 0%	4 22.2%
Lack of financial resources	6 33.3%	3 16.7%	2 11.1%	1 5.6%	0 0%	1 5.6%	2 11.1%	3 16.7%
Lack of personnel	2 11.1%	5 27.8%	6 33.3%	1 5.6%	2 11.1%	0 0%	0 0%	2 11.1%
Have not found one that meets needs of repository	3 16.7%	0 0%	2 11.1%	1 5.6%	2 11.1%	2 11.1%	0 0%	8 44.4%
Other	3 16.7%	0 0%	1 5.6%	0 0%	0 0%	0 0%	3 16.7%	14 77.8%

To better assess how respondents whose repositories do not employ a DAM system perceive barriers to its use, an index was created by multiplying the rank score assigned by archivists against the number of responses. For instance, the rank considered “greatest barrier” (1) was assigned the highest point value (7) and multiplied by the number of associated responses. The table below shows an example of how this index was created. The full index is graphed in Figure 7.

Example Index: No Perceived Need for DAM System

Barrier Rank	Greatest Barrier 1	2	3	4	5	6	7	Not a barrier (no response)	
Assigned index value	7	6	5	4	3	2	1	0	
Number of responses	2	2	0	2	1	1	3	7	Number of responses: 11
Index score	14	12	0	8	3	2	3	0	Total index score: 42

Figure 7: Barriers Against DAMS Implementation Index



“Lack of personnel, “lack of financial resources,” and “lack of institutional support” were cited as the greatest impediments to DAM system use by a majority of archivists surveyed. Barriers cited by archivists as “other” included the lack of opportunities for advocacy for digital asset management, problems encountered when integrating DAM system functionality with existing systems, and management’s resistance to technology adoption.

It is not only institutions that do not use a DAM system that encounter barriers to system implementation and use. Even among those that do use DAM systems, 16 respondents discussed problems they have with system implementation and integration. In the free-text response at the end of the survey, archivists pointed to a lack of integration with current systems, lack of key functionality (specifically digital preservation capability), a lack of institutional support or resistance to change, a lack of understanding of the importance of digital assets, and silos between the departments needed to integrate these systems as significant impediments to proper digital asset management, even with the use of a DAM system.

This was not a systematic exploration of barriers to DAM system use, but certain trends nonetheless emerged. Themes were identified and categories were developed based on those themes. Each comment in which a respondent identified a problem with DAM system implementation was assigned to an appropriate category or categories. Figure 8 shows the coded responses to the survey’s open-ended question, organized again by repositories that do and do not employ a DAM system.

Figure 8: Coded Responses to Free-Response Question

Please share any additional comments you may have about how your repository stores, manages, and provides access to digitized content. For instance, please expound upon any barriers you perceive to DAMS use, or discuss the adequacy of your institution's system for managing digitized content.			
Problem with DAMS Implementation	Use DAMS (n=32)	Do not use DAMS (n=18)	Total
Lack of integration with other systems	9	2	11
Lack of financial resources	6	3	9
Lack of interest in or understanding of digital projects by key players	2	4	6
Lack of technical expertise	3	3	6
Silos among key departments	4	1	5
Lack of staff/staff time	1	3	4
Lack of functionality/digital preservation capabilities	3	0	3

Further discussion of participants' responses is included in the following section.

Discussion

Functionality and Integration with Existing Systems and Workflow

At the DigCCurr 2009 conference, Clifford Lynch noted that when it comes to digital preservation, “doing things on one perfectly coordinated centralized platform is a massive act of hubris.” Indeed, considering the number of activities that are required for the management of digital assets in an archival repository, it is not surprising that regardless of whether or not a DAM system is used, so many institutions rely on a patchwork of solutions to manage their digital assets.

While a majority of institutions surveyed reported using a DAM system, they also reported using it in conjunction with a number of other sophisticated software and native applications, used in a range of combinations. Despite the rich functionality DAM systems provide, they are not a comprehensive solution, which speaks again to the

complexity of managing digital assets. This is especially true in archival repositories, which promise the added value of preservation and continued access. At the same time, results do not suggest that any particular solution or combination of software solutions replaces the functionality that DAM systems can provide.

DAM systems lack some key functionality that repositories depend upon to guarantee the ongoing authenticity and integrity of their assets. Archivists touched on two problems in particular: the lack of long-term preservation capabilities and the lack of integration with other systems needed to manage and make accessible digitized material, as one archivist noted of the DAM system his/her repository uses:

Good for organizing and storing. Iffy on long term preservation. Not as seamlessly compatible with our website, so providing access has many steps involved.

An archivist whose repository does not use a DAM system noted a similar limitation:

[It] would be fantastic if an existing system in use (ArchivesSpace, CollectionSpace) had an associated DAMS rather than having to expend the time to learn one more system.

The investment necessary to learn and establish crosswalks between systems was considered a deterrent to using these systems.

Considering the buy-in needed for DAM system use across organizational boundaries, integration with existing workflows and organizational structures is as much a problem for DAM implementation as is interoperability with existing systems. One archivist noted that workflow issues in managing digital assets are a problem between departments and among archives staff:

[T]he structural challenge is that we are dependent upon state IT for support and storage space, but have difficulty receiving the support and attention a project like this would require. The conceptual challenge is that the staff in charge of this

project, while familiar with inputting & storing information, are unfamiliar with access and retrieval needs on the researcher end, and are not accepting feedback from the staff who are.

Prioritizing Digital Assets

The problem with workflow integration speaks to a larger issue with digital asset management: the difficulty of advocating for digital asset management as an area that requires significant investment and collaboration between many parties. As noted above, scholars have spoken to the potential digital access to repository holdings has for adding value to institutions; specifically, providing access to digitized content is a method for advocating for a repository's usefulness. However, due to the complexity and cost of managing and making available digitized assets, digital assets must be advocated for before they can be employed to demonstrate the repository's value. As indicated by survey results (which point to lack of institutional support and funding as primary barriers to DAM system use), digitization-as-advocacy remains a difficult case to make.

This perception was reflected in survey comments:

The greatest barrier to these goals is a fundamental lack of understanding with regards to the scope of these projects – bluntly, [management] simply [does] not accept that digitizing and making available 60+ years of content is not a 6-month project. As of now, they have been unwilling to invest the necessary time and resources into such projects.

Even when digitized information is recognized as an asset by the organization – and even in the rare case where resources are not an issue – repositories report problems convincing management that a DAM system is a worthwhile investment:

The management at our institution does not see the value in acquiring a DAMS to manage digital content, even though we have several terabytes of archival information, including digital audio-video of oral history interviews which have been identified as our highest value archival asset. The current system for managing digital resources is a file folder system stored on the main hard drive. It

is accessible and changeable by anyone, lacks metadata, and lacks consistent taxonomy and filenames. Our system includes the extensive use of illegal characters, filenames that exceed the character limit list, inconsistent formats, no version control... you name it, the mess is there. Finding a resource that is needed takes hours and sometimes days. Rights management information is separated from the resource, if it's tracked at all. No one, no matter how intelligent and articulate has been able to convince management that we need to find a better way to manage our digital content, despite the fact that we are the only museum I know of that is not starving for resources. In our case, bad digital asset management is a direct result of a serious lack of will to change on the part of administration.

Digital asset management is therefore not just an investment in digitization programs, software purchasing and maintenance, or storage. It also requires an investment in building the capacity to advocate for stronger digital asset management among institutional players.

Opportunities and Strategies for Advocacy

As discussed above, moving from digitization projects to digitization programming demands developing “a set of strategic, resource management, financial and other solutions and actions” to fulfill the repository's and institution's goals (Manžuch 790). A critical element of this may also be the institutionalization of advocacy for digitization needs – including software needs – by archivists. Survey respondents pointed to a number of players critical to the success of digitization programming and software implementation – administration, information technology, other archivists within the repository, and the greater archival community. Considering that lack of support at any level may be detrimental to the implementation of a digital asset management program, it is crucial that archivists build a culture of advocacy for this area.

In 2012, Lisa Carter made a case for articulating the value of special collections in universities by demonstrating impact and added value of digitized collections in academic repositories, a model that can be easily extended to non-academic repositories. She emphasizes the importance of creating a “value proposition,” a proposition informed by knowing the costs and benefits of a digital collection gathered through “the comprehensive assessment of our collections, our productivity, and the impact of our services” in order to “better articulate how we fit into larger opportunities for collaboration, partnership, and resource sharing” (92). This is done in part by doing what she terms “self-determination”: comprehensively and strategically determining and responding to what best addresses the repository’s needs, rather than “reacting to the demands of a researcher or donor, a new funding opportunity, or new attention from an administrator.” To demonstrate success, articulate needs, and evaluate opportunities, Carter promotes “embracing a culture of assessment” that “grounds our advocacy and resource allocation in evidence provided by verifiable analysis” (98).

Advocacy can build collaborative partners who become invested in the success of digitization programs. In a discussion of the success of UNC-Greensboro’s University Archives 2013 advocacy efforts for collecting born-digital material, Erin Lawrimore recognizes the necessity of building partnerships for the success of digital asset management:

While archivists may have a basic understanding of advances in communications technologies, they rarely have the programming skills needed to create a tool to effectively manage these responsibilities. This is where they must find partners who can provide the technical know-how necessary to take on and support these important tasks. (189-190).

The author suggests building such partnerships specifically with information technology departments through the use of jargon-neutral language, by building upon mutual interests and workflows, by opening communication regarding requirements and limitations, and by demonstrating a desire to learn each other's areas. She also demonstrates how building a culture of advocacy was central to prioritizing this program: at UNCG,

Presentations were given to the Libraries' administrative leaders and department heads, talking points were created for the department head to hold conversations with the Dean of the Libraries, and other parties across campus (including the campus's Information Technology Systems unit) were brought into the conversation, all in an effort to gain broad support and buy-in for the development of the born-digital program. It was only after this wide-scale advocacy effort that the development of a system for acquiring and managing born-digital archival records was made a departmental and University Libraries priority. (194-195).

In this survey, archivists similarly pointed to the importance of having a network in support of digital asset management, whether built laterally (with support departments like information technology), hierarchically (with administration), or externally (with other organizations). One archivist noted that the DAM system used by his/her repository is successful in part because it “is also very popular among small repositories here and so we have an interorganisational support group (safety in numbers).”

Another respondent attributed the success of his/her repository's digitization program to the service the DAM system provides to an unlikely partner:

Our DAMS is run through the Marketing and Communications department and not under library or archival supervision, so decisions made for digitization and management of digital content is from a publicity and functional point of view rather than a strictly archival or preservation standpoint. I think it strikes a good balance because they are the most frequent users of the collection and can easily determine what photographs should be scanned and kept digitally based on their needs, with the limited budget for the project.

It may not be a perfect solution, but in this case, it is a workable solution because it considers the needs of other stakeholders to inform the implementation of the digitization program and the software needed to sustain it.

Limitations and Future Research

This study considers the use and non-use of DAM systems outside of academic archival repositories, and while the survey gathered information about repository type, a better method of analysis may be to consider the relative size of digital holdings or repository's resources in order to better discover at what point a DAM system solution may be necessary, and to consider the implications of DAM system use or non-use relative to different collection sizes. This survey asked only respondents whose repositories do not use a DAM system what barriers they perceive to its use. However, responses to the free-text question made it clear that respondents who do use a DAM system encounter significant and ongoing system problems. Therefore, a more systematic exploration of barriers to DAM system use among DAM system users may have added a useful perspective to the challenges of digital asset management.

Additional future avenues of research may include exploring how archivists are collaborating with software designers to create tools that serve their unique purposes in regards to digital asset management, and exploring specific strategies archivists are taking to advocate and collaborate to manage digitized records as digital assets. While this survey considered specifically digitized records as digital assets, future research may consider the sufficiency of digital asset management systems in managing born-digital records in a preservation environment.

Conclusion

Providing digital access to a repository's holdings is a strategy that is commonly relied upon to affirm the value of the repository to user groups, umbrella institutions, and funders. However, the systems that are necessary to provide such access demand high levels of investment at many levels of the organization, and survey results show that a main barrier to DAM system use is the lack of such support, particularly from the technical and administrative departments whose buy-in is crucial to the success of such programs. Building a culture of advocacy around assessment of digitization programming is one step towards fostering champions who understand the requirements for successful, sustainable digital asset management.

Appendix A: Survey

The purpose of this research (IRB #14-0039) is to establish how widespread digital asset management system (DAMS) use is among non-academic archival repositories, what the greatest perceived barriers to DAMS use are, and lacking a DAMS, what alternative solutions repositories are adopting to manage digitized records.

Following an informed consent form and a definition of terms as used in this research, this survey consists of multiple-choice questions and one open-ended question. You may navigate backwards at any point during the survey to change answers.

This survey is expected to take no more than ten minutes to complete.

1. What type of repository do you represent? Check all that apply.

- Cultural/Historical
- Government
- Museum
- Private/Corporate
- Personal
- Scientific
- Other (Identify:_____)

2. Approximately what percentage of your repository's material has been digitized?

- 0-25%
- 26-50%
- 51-75%
- 76-100%

3. Does your repository use a digital assets management system* to manage its digitized material?

- Yes (Note: if "yes" skips to question 6)
- No

* Popular DAMSs include Adobe Lightroom , Artesia, Canto Cumulus, ContentDM, DSpace, Ex Libris Rosetta, Extensis Portfolio, Fedora, Notre DAM, Nuxeo DAM/DM, and ResourceSpace.

4. Why does your repository not use a digital asset management system? Rank the following options from 1 (most significant barrier to DAMS use) to 7 (least significant barrier). If an option does not apply, you may leave it blank.

- No perceived need for such a system
- Not familiar with such systems
- Lack of institutional support

- Lack of financial resources
- Lack of personnel resources
- Have not found one that meets needs of the repository
- Other (identify:_____)

5. In what other ways does your repository store, manage, and access its digitized content? Check all that apply.

- File manager native to operating system (e.g. Windows Explorer, Mac OS X Finder)
- Image browser application (e.g. Photoshop Bridge, ACDSSee, Picasa)
- Web content management system (e.g. Wordpress, Joomla!, Drupal)
- Enterprise content management system (e.g. Alfresco, Sharepoint)
- Institutional repository
- Archival collections management system to manage administrative data about digitized collections (e.g. Archivists' Toolkit)
- Other solution (Identify: _____)

6. Please share any additional comments you may have about how your repository stores, manages, and provides access to digitized content. For instance, please expound upon any barriers you perceive to DAMS use, or discuss the adequacy of your institution's system for managing digitized content.

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