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# Taking Control: Identifying Motivations for Migrating Library Digital Asset Management Systems

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## Abstract

This paper analyzes and discusses results from "Identifying Motivations for DAMS Migration: A Survey," which traces institutions' motivations for migrating from one DAMS to another. Using data from the survey, the researchers ask two questions: "What motivations prompted institutions to migrate from one DAMS to another?" and "In what directions are institutions moving?" The researchers find that respondents desire more local control over the library DAMS and, when faced with the decision to migrate, institutions are more often than not choosing open source software systems. The researchers conclude the paper by reviewing lessons learned from the research methodology and discussing future areas of exploration related to this study. The findings of this study can inform future DAMS selection and development.

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## 1 Introduction

In the last two decades, digital asset management systems (DAMS) have become important tools for collecting, preserving, and disseminating digitized and born digital content to library patrons. Over time, libraries have started to re-assess their DAMS based on the changing needs of users, the increased expertise of library professionals, and the ever-growing creation of web-based technologies. As a result of this re-evaluation process, some libraries decide to migrate to a new DAMS solution. While anecdotal evidence for the purpose and outcomes of these migrations are available, no extensive study on the process and rationale for library DAMS migration exists in the professional literature.

In the fall of 2014, the researchers of this study conducted a survey titled "Identifying Motivations for DAMS Migration: A Survey" in order to better understand why institutions are migrating from one system to another. The results from the survey were used to answer the following two research questions:

1. What motivations prompt institutions to migrate from one DAMS to another?
  2. In what directions are institutions moving? For example, are institutions moving from proprietary systems to open source systems?
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## 1.1 Definitions

In the context of this paper, the researchers drew on the following terms:

- *Proprietary*: "...any software that is copyrighted and bears limits against use, distribution and modification that are imposed by its publisher, vendor or developer. Proprietary software remains the property of its owner/creator and is used by end-users/organizations under predefined conditions"<sup>1</sup>
- *Open Source*: "open-source software (OSS) is computer software for which the source code and certain other rights normally reserved for copyright holders are provided under a software license that meets the open-source definition in the public domain...It is very often developed in a public, collaborative manner"<sup>2</sup>
- *Home Grown*: "in house software development"<sup>3</sup>
- *Digital Asset Management System (DAMS)*<sup>4</sup>: "software that supports the ingest, description, tracking, discovery, retrieval, searching, and distribution of collections of digital objects"<sup>5</sup>

## 2 Literature Review

### 2.1 Selecting Initial DAMS

Evaluating and choosing a digital asset management system can be a long, complex, and resource-intensive process. As librarians identified DAMS for their institutions, they began to document their methodology for others to reference and adapt. Some of the earliest works addressing the selection of a DAMS focused on policy and planning considerations. H. Frank Cervone identified high-level planning strategies to make selecting a DAMS manageable for information professionals.<sup>6</sup> Other literature described how information professionals developed specific evaluation criteria for selecting a system. Hoe-Lian Goh, *et al.*, created an instrument that selected a DAMS based on a numeric score derived from comparing prospective DAMS against twelve categories generated by the authors, including content management, metadata, preservation, and the user interface.<sup>7</sup> DeRidder refined the DAMS evaluation process further by encouraging others to conduct a formal needs assessment.<sup>8</sup> Jennifer L. Marill and Edward C. Luczak established criteria for both an initial assessment of systems and a more exhaustive examination of a limited number of final candidates.<sup>9</sup> Collectively, these studies highlighted different aspects of DAMS that resonated with librarians who were charged with creating, implementing, and managing digital libraries.

### 2.2 Case Studies of Digital Library Migration

Over a decade has passed since many institutions initially selected DAMS for their digital assets. In that time, libraries have refined their needs for these systems and, consequently, have migrated, or wanted to migrate, to another DAMS. Although the literature on the migration process and the implications it has on the library profession is limited, in the following section we present several case studies of repository migration.

In one of the earliest case studies involving DAMS migration, Indiana University (IU) moved their content from Variations, their original, homegrown digital music library system, to a newly developed system called Variations2<sup>10</sup>. The rationale for migrating systems included several reasons: demand for additional media and document formats; expanding the metadata; and the need to support new tools for "access, synchronization, and navigation."<sup>11</sup> IU developed the first Variations system in order to distribute music recordings over a network within the Music Library and it was developed in-house because none of the commercial software available at the time was capable of meeting all of their needs.<sup>12</sup> Additionally, the projects were supported by grants from the

National Science Foundation (NSF) and the National Endowment for the Humanities (NEH). The migration from Variations to Variations2 is significant because it resulted in a system that not only provided access to specialized content but also provided tools that allowed users to actively interact with the content in more dynamic ways.<sup>13</sup>

In her presentation "Migrating from OCLC's Digital Archive to DuraCloud," Lisa Gregory shared the State Library of North Carolina's experience with DAMS migration.<sup>14</sup> The State Library of North Carolina found extensive reports, fixity checks, and virus scans offered by OCLC's Digital Archive to be critical pieces of their preservation solution. However, they also identified several issues with the DAMS, including: difficulties finding and retrieving items and confronting upload requirements. As a result of these issues, they migrated to DuraCloud in 2012. While DuraCloud still presented barriers to DAMS administration (particularly when it came to searching content and overwriting data), librarians praised it for its user-friendly interface, robust reporting, and collaborative support community. Her presentation demonstrated the important role digital preservation plays in deciding to migrate from one DAMS to another and reiterated the need for preservation issues and standards to be incorporated into the tools and best practices used by librarians when implementing a DAMS migration.<sup>15</sup>

The College of Charleston Libraries (CoCL) manage the Lowcountry Digital Library (LCDL), which is made up of partner institutions who contribute digitized materials about the Lowcountry region.<sup>16</sup> Originally, the LCDL was built in CONTENTdm.<sup>17</sup> However, due to dissatisfaction with CONTENTdm technical support, inaccurate search results, and license and maintenance fees, the CoCL made the decision to find another solution.<sup>18</sup> CoCL assessed Omeka and DSpace as possible alternatives, but due to the unique nature of the LCDL, they determined that Omeka would not be able to scale to the level LCDL required. DSpace was deemed an acceptable Plan B, but its limited visual content display functionality among other concerns kept CoCL from adopting it. The version of Islandora available at the time was also deemed to not be robust enough for the LCDL's unique needs. Determining no out of the box solution (open source or proprietary) would meet their needs, CoCL decided to build a new system using disparate open source software programs, which were: Fedora Commons (for storage), OpenWMS (for ingest), Blacklight (for a discovery layer), and Drupal (for web interface).<sup>19</sup> CoCL found that the new system was flexible enough to meet the needs of the consortial LCDL and improved upon the issues they experienced under CONTENTdm.<sup>20</sup> This case is significant because the staff who undertook the vast majority of the work consisted of two people who happened to be involved with the LCDL and had some coding skills, showing that building a new digital asset management system for an entire consortium did not require full time web developers.<sup>21</sup>

Since the Digital Resources Library department at Texas Tech University Library identifies the main user community for their digital library content as external researchers rather than local ones, they rely heavily on traffic from search engines and external websites. Using Google Analytics, they copied a collection that was already in CONTENTdm to DSpace. They found that the collection in CONTENTdm did not appear on the first page of results, while the collection in DSpace consistently did. Due to the dramatic difference in search engine optimization (SEO) rankings, TTU Libraries opted to migrate all of their digital library content to DSpace. These results are significant because they show the importance of search engine traffic to the discoverability of library digital collections.<sup>22</sup>

In 2010, Archives New Zealand (ANZ) was charged to develop and implement a Government Digital Archive.<sup>23</sup> Since ANZ's sister institution, The National Library of New Zealand (NLNZ), had already put in a substantial amount of work and resources into their own digital asset management system for digital preservation, called Rosetta<sup>24</sup>, ANZ decided to use that system as their final DAMS for preservation.<sup>25</sup> In 2008, ANZ implemented Fedora Commons as an interim solution since planning for a "complete digital preservation system" was already in progress.<sup>26</sup> In addition to building on previous work, ANZ wanted to migrate away from Fedora Commons because they found that "it had limited functionality to support the business processes involved in accepting and managing a digital archive."<sup>27</sup> This case study is significant, because it highlights an instance of an institution migrating from an open source DAMS to a commercial one, albeit one that was developed in partnership with Ex Libris.<sup>28</sup>

Examples from other states show the important role collaboration plays in the DAMS migration process. The Florida Council of State University Libraries (CSUL) Digital Initiatives Subcommittee (DISC) assessed institutional needs surrounding DAMS for digital collections and identified a single DAMS to share among the 10 academic university libraries that comprise its membership. The subcommittee concluded that libraries needed improved resources and skills, including more robust and scalable systems, to meet their digital library needs.<sup>29</sup> To aid in the selection process representatives from the different institutions created evaluation criteria based on the existing needs and projected uses of the membership. Like other evaluation methods, CSUL explored issues involving architecture, content, metadata, ingest, search and retrieval, display and use, export, management, and budgets.<sup>30</sup> In 2012, the committee recommended that the institutions select Islandora because it had "the most robust architecture, supported by the largest number of developers and the largest user community, running on the most widely available open source platform."<sup>31</sup> There are several reasons why this case is significant. First, it is a demonstration of a large consortial effort to evaluate and select a single system for system-wide use. They went from multiple DAMS, proprietary open source, and homegrown, to a single open source solution. This is one of the first examples of content in multiple and disparate systems being combined under a consortial infrastructure.

Another example of a multi-stakeholder digital library migration is the J. Willard Marriott Digital Library at the University of Utah. The University of Utah Library DAMS Review Task Force was charged by the Technology Services Council to review and evaluate their current DAMS as well as others.<sup>32</sup> The Task Force undertook a comprehensive evaluation of their current system and the other identified DAMS by soliciting input from users both of the J. Willard Marriott Digital Library and other partner libraries; comparing features and capabilities of their system to others and scoring each DAMS based on defined criteria; reviewing vendors and governing organizations by giving them a list of specific questions and evaluating them not only by the technical capabilities of the DAMS but also on the perceived enthusiasm of the vendors when responding to the questions; and finally performing a complete Strengths Weaknesses Opportunities Threats (SWOT) analysis of CONTENTdm, for both its current and future hosted iterations, and of the Hydra Project repository software.<sup>33</sup> After their extensive review process, the University of Utah Library DAMS Review Task Force decided to form a dedicated group to begin development of a repository built on the Hydra Project repository software architecture. This case is also significant for several reasons. It is a showcase of one of the most comprehensive and detailed documented evaluations, especially considering the use of prepared questions to DAMS vendors. The Task Force ultimately chose a solution that will require them to migrate from multiple proprietary DAMS to a single instance of an open source DAMS.

Analysis of these seven case studies reveals interesting trends among institutions and their shift from one DAMS to another — particularly around their motivations for migrating, the results of the DAMS selection, and methodologies used to select a new DAMS. The rationales for migrating systems are as varied as the institutions conducting the case studies. Some organizations used their dissatisfaction around key functions and services as a way to determine criteria for evaluating new systems. Others were driven by future needs, particularly a system's scalability and extensibility. The results of the case studies also begin to suggest a larger trend in the kind of platforms to which institutions are migrating. Four out of the seven libraries transitioned from proprietary to open source platforms; a consortium also selected an open source solution for all of its members, resulting in some institutions also transitioning from proprietary to open source. Anecdotally, these results suggest that institutions are increasingly looking towards open source systems as solutions for their DAMS needs.<sup>34</sup>

**Table 1: Chart of Migration Rationale and Movement**

Institution	Initial DAMS	New DAMS	Rationale for Migration	Movement
College of Charleston/Lowcountry Digital Library	CONTENTdm	Fedora, Drupal, OpenWMS, blacklight	Dissatisfaction with: <ul style="list-style-type: none"> <li>Vendor technical</li> </ul>	Proprietary to Open Source

			support <ul style="list-style-type: none"> <li>◦ Inaccurate search results in DAMS</li> <li>◦ License and maintenance fees</li> </ul>	
State Library of North Carolina	OCLC's Digital Archive	DuraCloud	Dissatisfaction with: <ul style="list-style-type: none"> <li>◦ Upload limits and requirements</li> <li>◦ Item discoverability in DAMS</li> </ul> Want to keep: <ul style="list-style-type: none"> <li>◦ Report features</li> <li>◦ Fixity check</li> <li>◦ Virus scans</li> </ul>	Proprietary to Open Source
Florida Council of State University Libraries	CONTENTdm, DigiTool, SobekCM	Islandora	Want increased: <ul style="list-style-type: none"> <li>◦ Robustness</li> <li>◦ Scalability</li> </ul>	Multiple Proprietary & Open Source to Single Open Source
Texas Tech University	CONTENTdm	DSpace	Dissatisfaction with: <ul style="list-style-type: none"> <li>◦ Search Engine Optimization (SEO) rankings</li> </ul>	Proprietary to Open Source
Indiana University	Variations	Variarions2	Want increased: <ul style="list-style-type: none"> <li>◦ Content type support</li> <li>◦ File format support</li> <li>◦ Metadata expansion</li> <li>◦ New features and capabilities</li> </ul>	Home Grown to Home Grown
Archives New Zealand	Fedora	Rosetta	Dissatisfaction with: <ul style="list-style-type: none"> <li>◦ Limited DAMS functionality</li> </ul>	Open Source to Proprietary
J. Williard Marriott	CONTENTdm	Hydra	Want increased:	Proprietary to Open

Digital Library at the University of Utah			<ul style="list-style-type: none"><li>◦ Scalability</li><li>◦ Robustness</li><li>◦ Community support</li><li>◦ DAMS customiazation</li></ul>	Source
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3 Methodology

3.1 Survey Design and Distribution

For the purposes of this study, the researchers analyzed data from their survey, titled: "[Identifying Motivations for DAMS Migration: A Survey](#)". The survey was created and delivered with the Qualtrics survey software, which utilized survey flow<sup>35</sup> and skip logic<sup>36</sup> functionality.

Researchers solicited participation from eligible institutions from July through September 2014. Institutions were eligible if they met one of the following criteria:

- Completed migration from the "Old DAMS" to the "New DAMS"
- Were currently migrating from the "Old DAMS" to the "New DAMS"
- Selected a "New DAMS" but had not started the migration process

If a respondent indicated that their institution did not meet one of these qualifications, the survey ended without allowing respondents to answer additional survey questions.

The survey asked respondents to choose the top five motivations from the thirteen topics. Respondents were then asked to prioritize their five selections in order from most important to least important. Based on these rankings, the Qualtrics survey software presented questions only in the topical areas respondents indicated, in the order they were ranked.<sup>37</sup> Since the complete survey has over 100 questions, the researchers used this method to reduce the overall time needed to complete it.

3.2 Development of survey sections, topics, and questions

The survey introduction explained the scope and purpose of the survey, defined key terms, and outlined each section of the survey for respondents. The researchers stated that the purpose of the survey was to focus on "identifying libraries' motivations for transitioning from one digital asset management system (DAMS) to another, in order to provide access to primary source research materials." The scope emphasized that the survey did not focus on systems used *exclusively* as institutional repositories, which the researchers define as repositories that provide access to university scholarship.

Because existing data and case studies regarding DAMS migration were often limited to posters and PowerPoint presentations as opposed to formal articles or research studies, the researchers elected to conduct a survey to answer their research questions. To generate the content for the survey, the researchers studied existing methods for initially selecting DAMS to identify key themes. Drawing upon DeRidder,<sup>38</sup> Hoe-Lian Goh, *et al.*,<sup>39</sup> Marill and Luczak,<sup>40</sup> and Andro, *et al.*,<sup>41</sup> the researchers distinguished thirteen topic areas used to evaluate and select DAMS.

Table 2: Survey Topics and Descriptions

Name of Topic	Description of Topic
Implementation & Day-to-Day Costs	The software, hardware, and personnel costs of implementing the "New DAMS" and the software, hardware, maintenance, and personnel costs of operating the system on a day to day basis.
User Administration	The management of user accounts including adding, restricting, and removing of accounts; levels of user accounts with varying permissions; user authentication methods such as LDAP, Shibboleth, OAuth, etc.
Organizational Viability	The governing organization's business model, defined mandate, and budget.
Technical Support	The availability and quality of the "New DAMS's" technical documentation, how-to manuals, active developer and/or user communities, formal help desk support, customer service, and bug reporting.
System Administration	The "New DAMS's" automation of tasks; system security; usage tracking and analytics; system performance and reliability; and use of common technologies, such as Windows or Linux server software.
Extensibility	The ability to incorporate additional functionality and capabilities to the "New DAMS" via viewing and manipulating the system code base, APIs, social media integration, or other measures.
Information Retrieval & Access	The quality and relevancy of the "New DAMS's" search results, search engine optimization rankings, and browsing capabilities.
Content Management	Collection content and administration in the "New DAMS", including file formats, ingest issues, scalability, and rights management information.
Preservation	The integration of preservation strategies into the "New DAMS", including fixity verification and the creation of checksum values, backups, synchronization, and/or the generation of archival information packages (AIPs).
User Interface Customization	The user interface, including the ability to customize and brand the interface as well as to adapt, edit, and revise the design and features based on user and repository needs.
Interoperability	The "New DAMS's" ability to export metadata into other DAMS and digital program environments. The "New DAMS" should support international and/or industry standards for interoperability, including OAI-PMH, Z39.50, and SRU/SRW protocols.
Reputation	The number of institutions that have implemented the "New DAMS" and their satisfaction with it.
Metadata Standards	The "New DAMS's" support of established metadata standards, user generated metadata, and linked data technologies.

The researchers crafted specific questions for each of these thirteen topics. The questions were designed to understand how important specific issues were to institutions as they were selecting a new system or migrating from the "Old DAMS" to the "New DAMS". The researchers generated two types of questions for the body of the survey. Most questions used a Likert scale of 1 [Not Important], 2 [Somewhat Important], 3 [Important], and 4 [Very Important], in order to gauge the degree to which specific issues impacted the decisions to migrate and the New DAMS' selection process. Other questions asked respondents to select all the options that applied to a specific issue. These questions were intended to identify which specific tools, software, or standards were desired in the "New DAMS".

The researchers also asked respondents demographic questions about their institutions. Specifically, respondents were asked to identify:

- Where their institution was in the migration process<sup>42</sup>
- What software they were using for their "Old DAMS"
- What software they were using or going to implement for the "New DAMS"
- How long the decision making process took
- What type of library the respondents worked for

The demographic section also had an optional question for respondents to disclose the name of the library and the parent institution. That information will not be disclosed in this paper.

**Table 3: Respondent's Type of Library**

Type of Library	N	%
Academic	30	61
Research	8	16
Public	4	8
Special	2	4
Special Collections/Archives	2	4
Government	2	4
Academic Library Consortia	1	2
Museum	0	0
<b>Total Responses</b>	<b>49</b>	<b>99<sup>43</sup></b>

While the researchers would prefer to analyze and discuss the results of every question from the survey in this paper, due to time and space constraints this is not possible. The researchers used the top five categories identified by respondents to answer the first research question. They discuss these results by analyzing the mean, standard deviation, and variance of the Likert scale questions. Additionally, the researchers decided that the needs discussed in depth should not include "obvious" results. For example, all respondents indicated that the New DAMS should have "The ability to support descriptive metadata standards", as important or very important. It is well known that descriptive metadata is mandatory for the discovery of resources in DAMS, so this question was not included for further analysis.

## 4 Results

Forty-nine respondents completed the survey. Since the researchers solicited anonymous responses from listserv subscribers, they did not have the information needed to calculate a response rate. Once initiated, the survey had a completion rate of 47%. The survey responses are organized into the following sections: Background on the Migration Process, System Movement, and Factors for Migration. The final section in Results has two subsections, 'the Top Five Reasons for Migrating' and 'Priority Rankings'.

### 4.1 Background on the Migration Process

As part of the demographics section, participants were asked at what stage of the migration process their institutions were at the time of the survey. The results are as follows:

**Table 4: Respondent's Status in the Migration Process Timeline**



Response	N	%
Respondents are currently migrating from the "Old DAMS" to the "New DAMS".	18	37
Respondents have completed the migration process from the "Old DAMS" to the "New DAMS".	17	35
Respondents have selected a "New DAMS" but have not started the migration process.	12	24
Respondents are in the process of selecting a New DAMS.	1	2
Respondents are moving data into a preservation system from Old System, but keeping both for a time.	1	2
<b>Total Responses</b>	<b>49</b>	<b>100</b>

Almost 40% of all respondents were currently in the process of migrating from the "Old DAMS" to the "New DAMS" at the time of the survey. Thirty-five percent had completed the migration process and 24% had selected a new system but were still preparing to migrate.

The migration selection process took most respondents six months to one year to complete. Thirteen respondents took over one year to migrate and twelve respondents took six months or less to complete the migration process.

**Table 5: How Long Did the Decision Making Process Take to Select the "New DAMS"?**

Response	N	%
6 months - 1 year	24	49
1-2 years	13	27
0-6 months	12	24
Other	0	0
<b>Total Responses</b>	<b>49</b>	<b>100</b>

## 4.2 System Movement

Migrating DAMS provides institutions the opportunity to transition from one type of repository (proprietary, open source, or home grown) to another.

Prior to migration, a slight majority of respondents (52%) used proprietary systems to administer their digital library environments, including DigiTool and CONTENTdm. Just over one-quarter (27%) of respondents used open source repositories before migrating. A handful of other respondents were using home grown software or "other" approaches.

Of the institutions that elected to migrate from their "Old DAMS" to their "New DAMS," a majority of respondents indicated that they would be migrating to an open source platform (64%), primarily Islandora, Hydra/Fedora, and DSpace. Nearly one in five respondents (19%) indicated that they were migrating to a proprietary DAMS. A smaller percentage of respondents were creating home grown DAMS solutions or selecting "other" options.

**Table 6: The "Old DAMS" That the Respondents Were or Are Using**

Response	N	%	Type of Repository
DigiTool	13	23	Proprietary
ContentDM	11	20	Proprietary
DSpace	9	16	Open Source
Other	5	9	Other/NA

Fedora	4	7	Open Source
Home grown	3	5	Home grown
Luna	2	4	Proprietary
Islandora	1	2	Open Source
Digital Commons	1	2	Proprietary
EPrints	1	2	Open Source
Application Extender	1	2	Other/NA
Adobe Bridge	1	2	Other/NA
Filemaker Pro custom	1	2	Other/NA
Mimsy XG	1	2	Proprietary
SiteSearch (OCLC)	1	2	Proprietary
File system	1	2	Other/NA
Hydra/Fedora	0	0	Open Source
Greenstone	0	0	Open Source
<b>Total Responses</b>	<b>56<sup>44</sup></b>	<b>102<sup>45</sup></b>	

**Table 7: "Old DAMS" Type of Repository Totals and Percentages**

Type of Repository	N	%
Proprietary	29	52
Open Source	15	27
Other/NA	9	16
Home grown	3	5
<b>Total Responses</b>	<b>56</b>	<b>100</b>

**Table 8: The "New DAMS" That the Respondents Currently Are or Will Be Using**

Response	N	%	Type of Repository
Islandora	13	25	Open Source
Hydra/Fedora	6	12	Open Source
DSpace	4	8	Open Source
Other	4	8	Other/NA
Fedora	3	6	Open Source
SobekCM	3	6	Open Source
Home grown	3	6	Home grown
Digital Commons	2	4	Proprietary
Greenstone	2	4	Open Source
Rosetta	2	4	Proprietary

ContentDM	1	2	Proprietary
DigiTool	1	2	Proprietary
iBase	1	2	Proprietary
Vital	1	2	Proprietary
Undecided	1	2	Other/NA
Preservica	1	2	Proprietary
Luna	1	2	Proprietary
Blacklight	1	2	Open Source
Nuxeo	1	2	Open Source
EPrints	0	0	Open Source
<b>Total Responses</b>	51 <sup>46</sup>	101 <sup>47</sup>	

**Table 9: "New DAMS" Type of Repository Totals and Percentages**

Type of Repository	N	%
Open Source	33	65
Proprietary	10	20
Other/NA	5	10
Home grown	3	6
<b>Total Responses</b>	51	101 <sup>48</sup>

### 4.3 Factors for Migration

The methodology section described the process participants went through to pick their top areas of concern. The following table depicts the results from that exercise. The topic areas are displayed in order of most chosen to least chosen. The number of respondents who chose the topic area as a "top priority" is also displayed.

**Table 10: Top Areas of Concern When Selecting a "New DAMS" and Priority Ranking**

Response	N	%	Rank #1	Rank #2	Rank #3	Rank #4	Rank #5
Content Management	30	61	5	6	9	6	4
Metadata Standards	25	51	2	5	5	4	9
Extensibility	24	49	6	5	8	4	1
Preservation	23	47	9	2	4	6	2
User Interface Customization	23	47	3	7	3	4	6
Technical Support	21	43	2	6	4	2	7
Implementation & Day-to-Day Costs	20	41	10	4	2	1	3
Interoperability	19	39	3	1	5	4	6

Information Retrieval & Access	18	37	3	5	1	6	3
User Administration	13	27	2	2	5	3	1
System Administration	12	24	0	3	0	6	3
Organizational Viability	9	18	4	3	1	0	1
Reputation	8	16	0	0	2	3	3

#### 4.4 Top Five Reasons for Migrating

Survey results indicated that the following topics were the highest priority for those migrating from an old to a new DAMS:

1. Content Management
2. Metadata
3. Extensibility
4. Preservation / User Interface Customization
5. Technical Support

Note that the Preservation and User Interface Customization categories received the same number of responses. Therefore, both will be included in the list of top five reasons for migration. This tie creates a total of six categories in the top five reasons for migration.

The questions in Table 11 address content management issues. As a reminder, Likert scale questions had responses ranging from 1 [Not Important] to 4 [Very Important].

**Table 11: Survey questions related to Content Management**

Question	N	Mean	SD	Variance
The capacity of the "New DAMS" to contain increasing amounts of digital objects over time without negatively impacting performance.	28	3.75	0.52	0.27
The ability to batch upload content into the "New DAMS".	28	3.71	0.60	0.36
The ability to support various file formats.	28	3.61	0.79	0.62
The ability to allow embargoes or restricted access in certain circumstances.	28	3.57	0.69	0.48
The capacity to display both simple and complex digital objects.	29	3.48	0.78	0.62
The ability to display rights and intellectual property information.	28	3.46	0.69	0.48
The storage capacity to hold both simple and complex digital objects.	28	3.46	0.79	0.63
The number of items the "New DAMS" can batch upload at one time.	27	3.37	0.69	0.47
The size limit for ingesting content.	28	2.86	1.01	1.02

Tables 12 through 23 present responses to additional content related questions, including types of objects and file formats, metadata, preservation, identifiers, and support.

**Table 12: What Types of Objects Did You Desire the System to Display?**

Response	N	%
Manuscripts	24	83

Images	24	83
Maps	23	79
Books	22	76
Video Content	21	72
Audio Content	21	72
Spreadsheets	11	40
Graphs	9	31
3D Objects	8	28
Other	5	17
Research Data	2	7
GIS	1	3

**Table 13: What File Formats Did You Desire the "New DAMS" to Support?**

Response	N	%
PDF	28	98
JPEG	26	90
MP3	22	76
JPEG2000	21	72
TIFF	21	72
MP4	19	66
MOV	17	59
CSV	16	55
DOC	13	45
DOCX	12	41
KML	2	7
WAV	2	7
GIS	2	7
KMZ	1	3

**Table 14: Survey results related to Metadata**

Question	N	Mean	SD	Variance
The ability to support multiple metadata schema.	22	3.68	0.57	0.32
The ability to support administrative, preservation, structural, and/or technical metadata standards.	22	3.59	0.80	0.63
The ability to support local metadata standards and practices.	22	3.32	0.95	0.89
The "New DAMS" supports linked data technologies.	22	2.82	1.10	1.20

The ability to support user created metadata, such as tags or "folksonomies".

22

2.59

1.05

1.11

**Table 15: What Descriptive Metadata Standards/Schema Did You Desire the "New DAMS" to Support?**

Response	N	%
Dublin Core	19	90
MODS	16	76
EAD	12	57
MARC	10	48
VRA Core	7	33
PB Core	3	14
DDI	3	14
All Schema/Schema-less	3	14
GNS	1	5

Table 15 shows that while Dublin Core was the most popular response, several other standards/schema had high responses, which suggests that future systems should support multiple descriptive schema. Additionally, the researchers received several free text responses that said DAMS should support all metadata schema or should be schema-less.

**Table 16: What Administrative, Preservation, Structural, and/or Technical Metadata Standards Did You Desire the "New DAMS" to Support?**

Response	N	%
METS	18	90
PREMIS	15	75
TEI	8	40
VRA Core	5	25
MIX	2	10
PB Core	2	10

**Table 17: What Linked Data Technologies Did You Desire the "New DAMS" to Support?**

Response	N	%
RDF/XML	16	89
JSON	10	56
Rich Snippets/Rich Data	2	11
Other	1	6

**Table 18: Survey Results Related to Extensibility**

Question	N	Mean	SD	Variance
Institutions can create their own modules/plugins/widgets/etc. for the "New DAMS".	21	3.67	0.58	0.33
The "New DAMS" has an available API.	22	3.64	0.58	0.34
The code base is available for everyone to see and use (open source).	22	3.55	0.60	0.35
The "New DAMS" supports digital object identifiers.	22	3.23	0.97	0.95
The governing organization creates modules/plugins/widgets/etc. to fit the needs of your institution.	22	3.00	0.76	0.57
The "New DAMS" supports personal digital identifiers.	21	2.24	0.94	0.89
The "New DAMS" natively supports sharing to social media.	21	2.14	1.01	1.03
The "New DAMS" authenticates with social media and other SSO (single sign on) services (Facebook, Twitter, OpenID, Gravatar, etc.).	22	1.95	0.90	0.81

**Table 19: What Digital Object Identifiers Did You Want the "New DAMS" to Support?**

Response	N	%
DOI	17	61
ezid	4	14
ARK	3	11
handle	2	7
urn:nbn	1	4
Local Identifiers	1	4

**Table 20: What Personal Digital Identifiers Did You Want the "New DAMS" to Support?**

Response	N	%
ORCID	12	46
ARK	5	19
ResearcherID	4	15
Other	3	12
MADS authorities	1	4
ISNI	1	4

**Table 21: Survey Questions Related to DAMS Preservation Features and Functionality**

Question	N	Mean	SD	Variance
The ability generate checksum values for ingested digital assets.	20	3.55	0.76	0.58
The ability perform fixity verification for ingested digital assets.	19	3.53	0.77	0.60

The ability to assign unique identifiers for each AIP <sup>49</sup> .	19	3.32	1.00	1.01
The ability to support PREMIS or local preservation metadata schema.	20	3.30	0.98	0.96
The ability to produce AIPs.	20	3.15	0.88	0.77
The ability to integrate with other digital preservation tools.	20	3.15	0.88	0.77
The ability to synchronize content with other storage systems (including off site locations).	20	3.10	0.91	0.83
The ability to support multiple copies of the repository – including dark and light (open and closed) instances.	20	2.90	0.97	0.94

**Table 22: Survey Questions Related to DAMS User Interface Customization**

Question	N	Mean	SD	Variance
The ability to change interface features of the "New DAMS" to fit local needs.	20	3.80	0.41	0.17
The ability to custom brand the interface of the "New DAMS".	20	3.75	0.55	0.30
The interface of the "New DAMS" supports responsive web design.	20	3.35	0.93	0.87
The "New DAMS" can be accessed by mobile or tablet users.	20	3.30	0.80	0.64
The ability of the "New DAMS" interface to meet national and/or international accessibility standards.	20	3.20	0.89	0.80
The governing organization will do custom branding or feature selection for subscribing institutions.	20	2.40	1.35	1.83

**Table 23: Survey Questions Related to DAMS Technical Support**

Question	N	Mean	SD	Variance
Technical documentation for the "New DAMS" is readily available.	19	3.47	0.77	0.60
There is dedicated technical support available from the developer or from a third party.	20	3.45	0.76	0.58
Effectiveness of customer service support.	20	3.35	0.75	0.56
Promptness of customer service support.	20	3.30	0.86	0.75
There is an active developer community around the "New DAMS".	20	3.05	1.23	1.52
There is a ticket submission feature for reporting issues.	20	2.90	0.85	0.73

#### 4.5 Priority Rankings

Results surrounding the ranking of the categories do not align neatly with the overall top five topics. Some categories, while not receiving enough votes to enter the top five, had high priorities for respondents (for example, Implementation & Day-to-Day Costs). The survey software used this information to determine the display order of topic areas and their questions. The researchers determined that topics which fell outside of the



top five are considered out of scope for this article.

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## 5 Discussion

The researchers used a survey focused on discovering the motivations for migrating from one DAMS to another in order to answer two questions:

1. What needs and/or factors prompt institutions to migrate?
2. What "direction" are institutions migrating?

After analyzing the results, the researchers believe that an overarching need for self-autonomy and control drive organizations to migrate from one DAMS to another. Because institutions prefer to define the DAMS they use in their own terms, it should come as no surprise that respondents to the survey are trending towards DAMS derived from open source software. In this section, the researchers use survey results to answer these two questions in depth; at the same time, they also discuss the implications of their research and identify limitations to this study.<sup>50</sup>

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### 5.1 What needs and/or factors prompt institutions to migrate?

#### *Content Management*

The top Content Management need, as identified by survey respondents, is: "The ability to support various file formats". The high average of 3.61, combined with the relatively low standard deviation and variance indicate a consensus among survey respondents that the support of various file formats is important in the New DAMS. These results suggest that, while preferred file format standards exist for preservation purposes,<sup>51</sup> non-preservation DAMS that only support a limited set of file formats are not as useful for libraries. However, when these results are compared to the question "What file formats did you desire the "New DAMS" to support?" (select all that apply), the most popular text and image file formats largely align with the sustainable recommendations, e.g. PDF, JPEG/2000, and TIFF. For audio-visual formats, this is not the case. Because preservation file formats have not yet been standardized for all digital AV materials, the researchers could not include an array of preservation quality or sustainable AV file format options. MP3, MP4, and MOV formats were all considered important for the New DAMS to support, which surprised the researchers considering their proprietary nature. These results may suggest that libraries are primarily concerned with providing access to AV content in their digital library DAMS, and not necessarily placing a priority on the preservation of digital AV files.

Another top need identified in the Content Management topic is: "The capacity to display both simple and complex digital objects." The high mean, combined with the relatively low standard deviation and variance scores, indicate that it is an important function for the New DAMS. These results suggest that libraries are increasingly hosting diverse types of content in their digital environments. When these results are compared to those of the question "What types of objects did you desire the system to display?" (select all that apply), the most popular objects were simple digital objects, with manuscripts, images, and maps all ranking above complex digital objects,<sup>52</sup> such as books, video, and audio content. Still other types of complex digital objects, including research data, GIS data, spreadsheets, and 3D objects, failed to garner more than 40% interest from respondents. These results also pertain to the scope of the survey, which focused on systems that provided access to primary source content, such as digitized special collections materials, and specifically excluded systems used exclusively as institutional repositories.<sup>53</sup>

The last point of interest to discuss in the Content Management section was not considered a top need by respondents. The question, "The size limit for ingesting content", received an average of 2.86, a standard deviation of 1.01, and a variance of 1.02, meaning that most respondents did not consider this to be an important criteria for choosing a New DAMS. However, the high variance indicates that there is not a consensus among

respondents. The researchers found the lack of interest in the size limit for ingesting content to be puzzling considering that respondents indicated that the New DAMS should support, store, and display complex digital objects, including audiovisual materials, which are typically much larger than PDFs or still images. These results could suggest that institutions: are not uploading large amounts of audiovisual content to their DAMS at a time, relegating the ingest size limit to a lower priority; are comfortable uploading larger files programmatically; or that respondents may not be considering the technical needs of larger and more complex content.

### *Metadata*

The researchers found results pertaining to questions in the metadata section to be predominantly predictable.<sup>54</sup> In spite of this, there are some illuminating trends. For example, the results for the question "The ability to support multiple metadata schema" show a distinct positive consensus for this need. This result is notable because the current generation of DAMS are built around one or two specific metadata schema, e.g. CONTENTdm uses a Dublin Core variation; DSpace has Qualified Dublin Core as the default schema; Islandora generates Dublin Core data streams by default, with optional MODS metadata for increased descriptive metadata, etc. The argument can be made that the use of particular metadata schemas is heavily driven by the implemented systems. Until recently, most systems locked libraries into Dublin Core, with its incumbent advantages and disadvantages. Additionally, the results from the question "What descriptive metadata standards/schema did you desire the 'New DAMS' to support?", suggest that libraries want richer and more comprehensive metadata capability. These results, combined with the general trend in movement from proprietary to open source, suggests respondents seek increased metadata schema flexibility than is currently offered by most turnkey systems.

The responses to the survey question "The New DAMS supports linked data technologies" indicated a lack of consensus on whether or not linked data technologies were considered necessary for New DAMS. The lack of consensus reflects the present status of applied linked data technologies in the library world. Until relatively recently, linked data was, and still often is, an abstract or intangible concept. While research, investigation, and infrastructure development on library linked data has been underway for several years, it was not until the release of Fedora 4<sup>55</sup> and Quali OLE<sup>56</sup>, that native linked data library systems became readily available. Even between these two systems, only Fedora 4 can function as a DAMS.<sup>57</sup> The results showing the demand for multiple/all-schema support seem almost contradictory to the results regarding linked data, because systems that support linked data could (in theory) support multiple metadata schemas. The researchers believe that the lack of consensus regarding linked data is the product of confusion around general linked data knowledge, and a dearth of affordable and reliable linked data functioning DAMS. There is still a significant amount of work that needs to be accomplished before linked data technology is within reach of most libraries.

Responses to the question, "The ability to support user-created metadata such as tags or folksonomies" also indicated a lack of consensus among survey respondents. The researchers suspect that the type of user-created metadata needed in DAMS has changed over time<sup>58</sup>, and research-oriented user-metadata features, like highlighting and annotating, would be rated more highly. This topic is an area of future investigation that the researchers hope to explore further with research data and scholarship repositories.

### *Extensibility*

The top needs identified by survey respondents in the 'Extensibility' section indicate that institutions want a larger degree of local control over their DAMS. For example, the top need identified by participants in the Extensibility section is: "Institutions can create their own modules/plugins/widgets/etc. for the 'New DAMS'". The high mean of 3.67, combined with a low standard deviation of 0.58 and a variance of 0.33, indicate a high level of consensus among survey participants that it is very important for institutions to be able to create their own modules, plugins, and related functionality. Similarly, survey responses demonstrate that it is also important for the "New DAMS" to have an available API. This need is closely followed by the third highest ranked criteria in Extensibility: "The code base is available for everyone to see and use (open source)", which had a mean of 3.55, a standard deviation of .60, and a variance of .35, indicating unified support for open source software. This result, possibly

more than any other in this section, directly reinforces the overall trend that organizations are demanding increased local control of their DAMS.

The last Extensibility result that will be discussed is: "The governing organization creates modules/plugins/widgets/ etc. to fit the needs of your institution". This need qualifies as important because it has a mean of 3.00, a standard deviation of 0.76, and a variance of 0.57. The result somewhat surprised the researchers because it seems to directly contradict previous results in that respondents still want the governing organization (or vendor) to develop and create modules, plugins, and related functionality. Some libraries may not have the resources to hire or retain local developers. While respondents may want additional control of the "New DAMS," this does not necessarily signal an end to governing organizations providing services or systems.

### *Digital Preservation*

The high mean values for most of the digital preservation actions suggest that respondents desire the DAMS to execute preservation related tasks. Results from the questions "The ability to generate checksum values for ingested digital assets," with a mean of 3.55, a standard deviation of 0.76, and a variance of 0.58, and "The ability to perform fixity verification for ingested digital assets," with a mean of 3.53, a standard deviation of 0.77, and a variance of 0.60, show that respondents thought the process of generating and verifying checksums through the DAMS was very important. These findings suggest that many information professionals are focused on creating a mechanism to ensure the integrity of digital objects.<sup>59</sup>

Respondents viewed additional curatorial actions as important, including "The ability to produce AIPs," with a mean of 3.15, a standard deviation of 0.88, and a variance of 0.77, and "The ability to integrate with other digital preservation tools," with a mean of 3.15, a standard deviation of 0.88, and a variance of 0.77. Compared to the results for digital preservation related questions on file formats and detailed technical metadata, these results indicate a disconnect between what respondents know they should be doing in theory (e.g. creating and preserving AIPs) and what they do on a daily basis (collecting audio content as MP3 files instead of WAV files). This is surprising because most respondents ranked digital preservation as one of their top five priorities for migrating to a "New DAMS."

Other results related to digital preservation functions in a "New DAMS" were inconclusive. While some functionality had favorable response scores "The ability to synchronize content with other storage systems (including off site locations)," with a mean of 3.10, a standard deviation of 0.91, and a variance of 0.83, "The ability to assign unique identifiers for each AIP," with a mean of 3.32, a standard deviation of 1.00, and a variance of 1.01, and "The ability to support PREMIS or local preservation metadata schema" with a mean of 3.30, a standard deviation of 0.98, and a variance of 0.96, all have high standard deviations and variance scores. These responses were somewhat perplexing to the researchers because each of these questions cover core elements of digital preservation. These inconclusive results lend further support claims of a disconnect between digital preservation theory and daily practices.

Finally, respondents were also divided over the ability of the new system to "support multiple copies of the repository – including dark and light (open and closed) instances." Unlike topics mentioned in the previous paragraphs, this question's mean scored slightly lower than 3.0, indicating that it was not favored by most respondents. While it is possible that low scores were a result of genuine disinterest in the ability to store multiple copies, the researchers believe that the wording of the question may also be playing a role in the final score. The question fails to provide a storage location or examples of specific mechanisms that support multiple repository copies. However, not stipulating a location or tool may have misled respondents into thinking that these copies would be stored locally as opposed to being distributed geographically.

### *User Interface Customization*

Analyzing the results of the user interface customization section showed that local control and responsive interface design were both important aspects of a "New DAMS." Responses to "The ability to change interface features of the "New DAMS" to fit local needs," with a mean of 3.80, a standard deviation of 0.41, and a variance

of 0.17, and "The ability to custom brand the interface of the "New DAMS,"" with a mean of 3.75, a standard deviation of 0.55, and a variance of 0.30, scored very important. However, respondents scored "The governing organization will do custom branding or feature selection for subscribing institutions," with a mean of 2.40, standard deviation of 1.35, and a variance of 1.83, as not important. Survey responses illustrate that respondents desire the freedom to make interface decisions and changes, even with the option of having the governing organization maintain and customize the interface on behalf of the subscribing institution. Additionally, respondents ranked "The 'New DAMS' can be accessed by mobile or tablet users," with a mean of 3.30, a standard deviation of 0.80, and a variance of 0.64, as important. This last consideration is especially significant because it shows an awareness of current and future technology developments. The majority of web traffic now comes from mobile devices,<sup>60</sup> a trend that will only increase and potentially lead to more diverse access points with the advent of wearable technology and the so-called "Internet of Things".

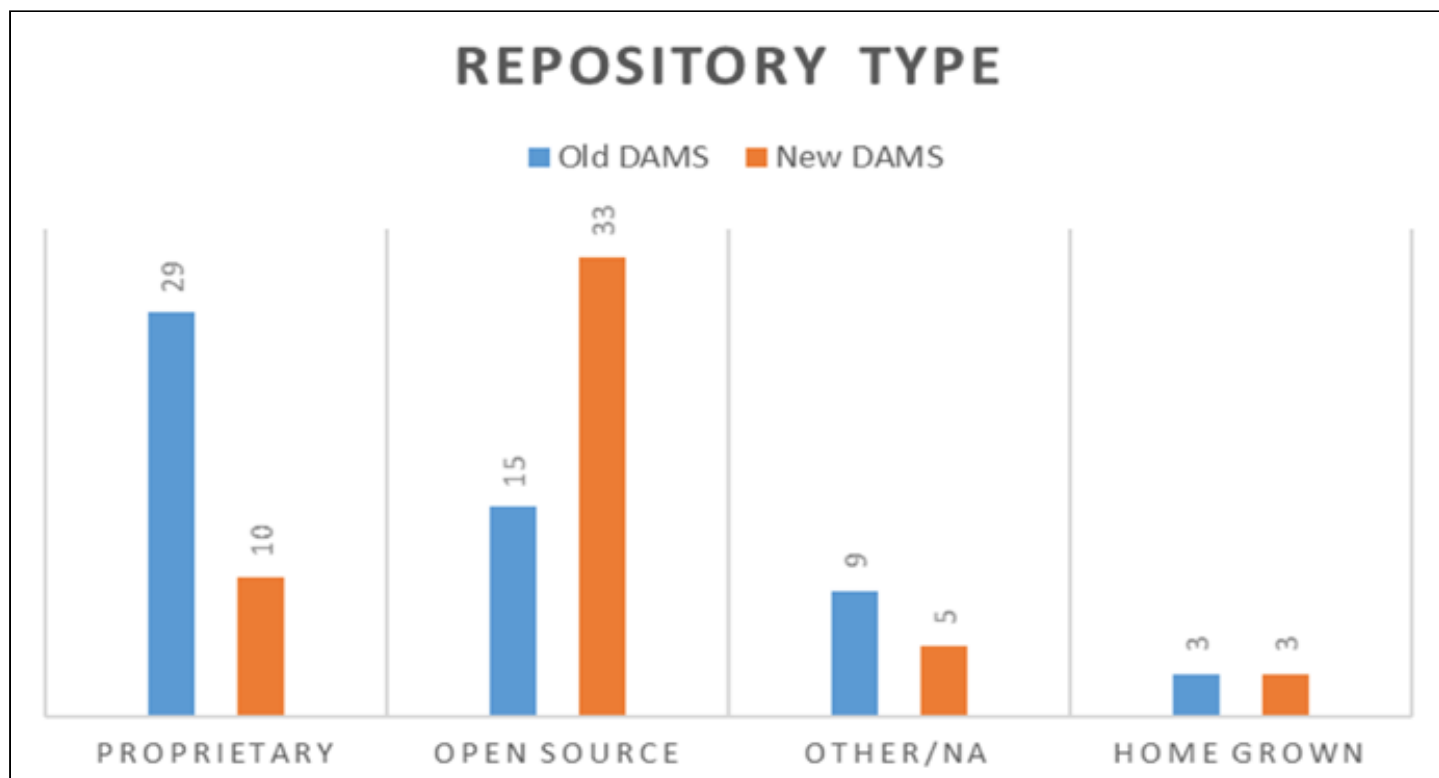
### *Technical Support*

Responses to "There is dedicated technical support available from the developer or from a third party," with a mean of 3.45, a standard deviation of 0.76, and a variance of 0.58, ranked as important among respondents. When it comes to this support, respondents felt that the "Promptness of customer support service," with a mean of 3.30, a standard deviation of 0.86, and a variance of 0.75, was also important. With a mean of 3.05, a high standard deviation of 1.23, and a variance of 1.52, results for "There is an active developer community around the "New DAMS"" showed a lack of consensus among respondents. This result suggests that respondents desire the ability to solicit support for technical problems from a designated group. Initially these results seem contradictory to the researchers' argument that institutions are moving towards local control. However, the ideas of local control and third party support are not mutually exclusive; while institutions' autonomy and control over DAMS should increase, vendors and governing organizations are still necessary to the long term maintenance and reliability of DAMS software.

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## **5.2 In what "direction" are institutions migrating?**

While just over half of the respondents originated with a proprietary DAMS, nearly two-thirds of the same institutions selected open source DAMS as the systems to which they were migrating. These results indicate that there is a trend to move towards open source software when migrating from one DAMS to another. This movement aligns with the other trend that institutions desire more local control and autonomy over their DAMS, and they are moving to the software solutions that will better meet these needs.



*Graph: Migration from "Old" to "New" DAMS by Type*

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## 6 Conclusion

### 6.1 Limitations

During the analysis of the data, the researchers identified several limitations with this study. Because researchers defined the scope of the project to include only those repositories administering digitized special collections materials, they did not ask questions nor collect data focused on other types of repositories (i.e. discipline, institutional, or data repositories).

Additionally, the way that researchers constructed survey questions may have impacted the study's results. There are several examples that illuminate this limitation. First, researchers did not supply enough appropriate answer options or failed to "follow up" on broad questions with more specific questions. In the metadata section, for example, the researchers focused entirely on user-created vocabularies, and did not include examples of added-value metadata, e.g. annotations. Second, broad questions regarding AIP creation and system integration with additional preservation tools left researchers with little understanding on how respondents desired this process to work. Third, the vocabulary used in particular questions may have created ambiguity for survey participants. This could have allowed one respondent to interpret the question differently than another respondent. For example, the survey question "There is an active developer community around the "New DAMS" may have implied a demand for an in-house developer as opposed to a broad user community of adopters. Finally, the researchers did not have a thorough enough understanding of some key concepts related to this survey. For example, they did not fully realize the nuances of OSS, especially regarding the complexity and overlap between hybrid OSS and proprietary systems.

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### 6.2 Next Steps and Future Research

In the process of conducting this study, the researchers identified areas of future inquiry. Research can build off of

the existing data set created through this study. For example, analyzing motivations by library type (academic, public, special, government) might yield different results depending on the demographics of an institution. Similarly, analyzing survey results from the topics that received high importance scores but were eliminated from this paper because they fell outside of the top five most important, could reveal additional motivations. Subsequent surveys could complement the results of this one, particularly those investigating migration patterns among other types of repositories excluded from this study. This research may also inform longitudinal studies focused on how the idea and adoption of OSS in libraries has changed over time. Finally, this type of study has exposed other related and unexplored research topics, including the overlap of homegrown and OSS DAMS systems and the creation of a rubric for selecting a library DAMS for migration.

In conclusion, the researchers believe that both the motivations for migrating from one DAMS to another and the trend of institutions moving from proprietary software to OSS derives from their desire for increased self-control over library systems. DAMS governing bodies and vendors should note these trends. Organizations should incorporate more strategic input and active participation from their customers if they are to continue to be relevant for the library community.

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## Notes

<sup>1</sup> ["What is Proprietary Software?"](#) Techopedia, (2015).

<sup>2</sup> K.T. Anuradha, R. Sivakaminathan, and P. Arun Kumar, "Open-source Tools for Enhancing Full-text Searching of OPACs," *Program* 45, no. 2 (April 26, 2011): 231-39. <http://doi.org/10.1108/00330331111129750>

<sup>3</sup> N. Venkatesh, "Development of Digital Assets Management Software for Research Centre Imarat," *DESIDOC Journal of Library & Information Technology* 32, no. 5 (Sep. 2012).

<sup>4</sup> The researchers used the term 'digital asset management system' instead of 'digital library' or 'digital repository' because it seemed to carry less preconceived connotation. It is not within the scope of this paper to explain the nuanced differences between these terms. For a more in-depth discussion on the concepts of DAMS, digital repositories, and digital libraries, please see the following articles: Christine L. Borgman, "What Are Digital Libraries? Competing Visions," *Information Processing and Management* 35, no. 3 (May 1999): 227–43, [http://doi.org/10.1016/S0306-4573\(98\)00059-4](http://doi.org/10.1016/S0306-4573(98)00059-4); Digital Library Federation, "[A Working Definition of Digital Library](#)," (1998); Clifford Lynch, "[Digital Collections, Digital Libraries and the Digitization of Cultural Heritage Information](#)," *First Monday* 7, no. 5 (May 6, 2002).

<sup>5</sup> Richard Pearce-Moses, "[Digital Assets Management System](#)," *A Glossary of Archival and Records Terminology*, Society of American Archivists (2005).

<sup>6</sup> H. Frank Cervone, "Some Considerations When Selecting Digital Library Software," *OCLC Systems & Services: International Digital Library* 22, no. 2 (2006): 107-110, <http://doi.org/10.1108/10650750610663987>

<sup>7</sup> Dion Hoe-Lian Goh, Alton Chua, Davina Anqi Khoo, Emily Boon-Hui Khoo, Eric Bok-Tong Mak, Maple Wen-Min Ng, "A Checklist for Evaluating Open Source Digital Library Software," *Online Information Review* 30, no. 4 (July 13, 2006): 360–379, <http://doi.org/10.1108/14684520610686283>



- <sup>8</sup> Jody L DeRidder, "Choosing Software for a Digital Library," *Library Hi Tech News* 24, no. 9 (2007): 19–21. DeRidder emphasized that the needs assessment should address: computer hardware and personnel, users of the digital library, software programming needs, the cost of maintaining the digital library, and the interoperability of metadata (pp. 19–21).
- <sup>9</sup> Jennifer L. Marill and Edward C. Luczak, "Evaluation of Digital Repository Software at the National Library of Medicine," *D-Lib Magazine* 15, no. 5/6 (May 2009). <http://doi.org/10.1045/may2009-marill>
- <sup>10</sup> Jon W. Dunn, Donald Byrd, Mark Notess, Jenn Riley, and Ryan Scherle, "Variations2: Retrieving and Using Music in an Academic Setting," *Communications of the ACM* 49, no. 8 (August 1, 2006): 53. <http://doi.org/10.1145/1145287.1145314>
- <sup>11</sup> Dunn *et al.*, "Variations2," p. 53.
- <sup>12</sup> Ibid.
- <sup>13</sup> Ibid. For example, users were able to annotate content and Variations2 would save these interactions to local metadata files for later reuse. The Variations projects are also significant because the research conducted with the experimental Variations2 system led to Variations3 and then ultimately to the Avalon Media System that is being developed in conjunction with Northwestern University; see: Avalon Media System Project, "[The Project](#)," Avalon Media System, 2015.
- <sup>14</sup> Lisa Gregory, "[Migrating from OCLC's Digital Archive to DuraCloud](#)," (presentation, Best Practices Exchange, December 2012).
- <sup>15</sup> Gregory, "Migrating from OCLC," slides 12-30.
- <sup>16</sup> See [Search the Lowcountry Digital Library](#).
- <sup>17</sup> Heather Gilbert and Tyler Mobley, "[Breaking Up With CONTENTdm: Why and How One Institution Took the Leap to Open Source](#)," *The Code4Lib Journal*, no. 20 (April 17, 2013).
- <sup>18</sup> Gilbert and Mobley, "Breaking Up with CONTENTdm."
- <sup>19</sup> Ibid.
- <sup>20</sup> Ibid.
- <sup>21</sup> Ibid.
- <sup>22</sup> Joy Marie Perrin, "[CONTENTdm to DSpace – Why?](#)," (poster presentation, Texas Conference on Digital Libraries, 2013).
- <sup>23</sup> Jan Hutař "Archives New Zealand Migration from Fedora Commons to the Rosetta Digital Preservation System," *iPRES2013 Proceedings*, (2013).
- <sup>24</sup> ExLibris [Rosetta](#).
- <sup>25</sup> Hutař, "Archives New Zealand Migration." ANZ and NLNZ were also both brought under the New Zealand Department of Internal Affairs, providing further support for using a single system and building on the work that had already been done.

26 Ibid.

27 Ibid.

28 Ibid.

29 The Florida Council of State University Libraries Digital Initiatives Subcommittee, "[Digital Initiatives Subcommittee Survey: Digital Library Inventory](#)". CSUL Meeting at University of West Florida," (2009).

30 Gail Clement, Laurie N. Taylor, Mark V. Sullivan, Lee Dotson, "[Features Desired in a Digital Library System](#)," (University of Florida Libraries: Gainesville, FL, 2010).

31 Emily Gore, Lee Dotson, Lois Widmer, "[Digital Library Platform Working Group Final Report](#)," (2012).

32 Kinza Masood and Anna Neatrour, "[Digital Asset Management System Options: Report of the University of Utah Libraries DAMS Review Task Force](#)" (Webinar, Online, February 6, 2014).

33 Masood and Neatrour, "Digital Asset Management System Options".

34 A third trend that emerged from these case studies was the absence of any formal methodology used to evaluate and select a DAMS in which to migrate. The researchers will not be addressing this issue in their current study.

35 "[About Survey Flow](#)," *Qualtrics*.

36 "[Skip Logic](#)," *Qualtrics*.

37 Most important to least important.

38 DeRidder. "Choosing Software for a Digital Library," pp. 19–21.

39 Goh *et al.*, "A Checklist for Evaluating Open Source Digital Library Software," pp. 360–379.

40 Marill and Luczak, "Evaluation of Digital Repository Software."

41 Mathieu Andro, Emmanuelle Asselin, and Marc Maisonneuve, "Digital Libraries: Comparison of 10 Software," *Library Collections, Acquisition and Technical Services* 36, no. 3–4 (2012): 79–83.  
<http://doi.org/10.1016/j.lcats.2012.05.002>

42 See eligibility questions.

43 Total does not sum to 100% due to rounding.

44 Researchers believe that this total resulted from some institutions having multiple "Old DAMS."

45 Total does not sum to 100% due to rounding.

46 Researchers believe that this total resulted from some institutions condensing multiple "Old DAMS" into one "New DAMS."

47 Total does not sum to 100% due to rounding.



<sup>48</sup> Total does not sum to 100% due to rounding.

<sup>49</sup> AIP is an acronym for an archival information package. For more information on the role of AIPs in digital preservation, please see the [Open Archival Information System Reference Model](#).

<sup>50</sup> As mentioned in the methodology, while the researchers would prefer to analyze and discuss the results of every question from the survey in this paper, due to time and space constraints this is not possible. The researchers discussed needs for each of the top five topics.

<sup>51</sup> "[Recommended Format Specifications – Resources \(Preservation, Library of Congress\)](#)," web page, *Recommended Format Specifications*.

<sup>52</sup> Defined here as: "Includes two or more content files (and their format variants or derivatives) and corresponding metadata. The content files are related as parts of a whole and are sequenced logically, such as pages." California Digital Library, "[Glossary](#)," *CDL Glossary*.

<sup>53</sup> See survey: "[Identifying Motivations for DAMS Migration: A Survey](#)".

<sup>54</sup> For example, every respondent answered "The ability to support descriptive metadata standards" was 'Important' or 'Very Important'.

<sup>55</sup> "[Features | Fedora Repository](#)," DuraSpace.

<sup>56</sup> "[Describe and Manage Module](#)," Kuali.

<sup>57</sup> In the context of this paper.

<sup>58</sup> Especially considering the proliferation of tablets, touchscreens, and phablets, which are defined as "A smartphone having a screen which is intermediate in size between that of a typical smartphone and a tablet computer." "[Phablet](#)," *Oxford Dictionary*.

<sup>59</sup> Michael Seadle, "Archiving in the Networked World: Authenticity and Integrity," *Library Hi Tech* 30, no. 3 (2012): 545-552, <http://doi.org/10.1108/07378831211266654>. As Michael Seadle (2012) states, checksums "give a reasonable approximation of whether two files are identical" by "adding up the number of bytes or bits in a file or part of a file. The checksum from a file ought to be identical with its copy. Any change indicates an integrity loss" (p. 551). Seadle also states "Not all checksum algorithms will necessarily detect a simple situation where two bits have flipped, but most bit-rot problems and almost any deliberate alteration of the digital object tend to create changes on a larger scale, making checksums an effective means of integrity assurance" (p. 551). For more on the role of integrity in digital objects, see Clifford Lynch, "[Authenticity and Integrity in the Digital Environment: An Exploratory Analysis of the Central Role of Trust](#)", Council on Library and Information Resources, Washington, DC, (2002); Reagan W. Moore and Mackenzie Smith, "[Automated Validation of Trusted Digital Repository Assessment Criteria](#)", *Journal of Digital Information* 8, No. 2 (2007); Seamus Ross, "[Position Paper on Integrity and Authenticity of Digital Cultural Heritage Objects](#)", *DigitCULT: Integrity and Authenticity of Digital Cultural Heritage Objects* 1, (2002).

<sup>60</sup> Sarah Perez, "[Majority Of Digital Media Consumption Now Takes Place In Mobile Apps](#)," *TechCrunch*.

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