**Repository Case History: University of Strathclyde Strathprints**

**Organisational context**

The University of Strathclyde is a large, well-established university located in Glasgow, Scotland, with about 20000 students (full-time equivalent) and the usual mix of teaching and research. It is probably best known and strongest in business and engineering.

**The repository's mission**

Strathprints is an institutional eprint repository for making research papers and other scholarly publications widely available on the Internet.

**Building a business case**

The repository is not a business and its purpose is not to make money. The implicit plan was to keep costs low but make the repository valuable and effective quickly by adding a large body of content and demonstrating substantial usage ('if we build it, they will come'). The only additional cost to the University to date has been one full-time member of staff and one standard PC with 120Gb disk space (the server). The ideal is that the repository is viewed as a showcase for the University's research output and an important element in its overall objective of being a centre for research excellence.

**Hosting and support**

Hardware, operating system and backups are managed by the system support team of the Department of Computer and Information Sciences (CIS). It is a minor matter for them as they run several similar servers and the support load is minimal. Eprints and usage statistics software have been installed, configured and managed by the Centre for Digital Library Research (CDLR), which works closely with CIS and the University Library. One key issue here is that staff have direct access to configure eprints and underlying systems if necessary (though this is rarely required), as the hosting is local rather than with an external group.

**Overview of current contents**

Strathprints had 4746 records as at 27 Feb 2008, most of which describe published research papers: 3522 articles, 472 book chapters, 395 conference items, 177 monographs, 141 books, 12 theses, 9 patents and 18 other items. 1012 records (21.3%) currently have a full-text document available; 3734 have only metadata. Efforts are being made to increase this ratio. Most documents are in PDF, with only a few in Word or HTML. There are currently a further 156 records in the submission buffer and 145 in the deletion table.

**Overview of current deposit activity**

There are 202 registered users, of which 44 have either deposited an item or have had ownership of a previously deposited item assigned to them. Most records are uploaded to the submission buffer in batches by the Strathprints administrator in CDLR, using the import\_eprints program. Corresponding department and LCC subject codes are also entered in batches, directly into the relevant tables of the MySQL database. The XML files required for import into eprints are generated automatically from an Access database, which in turn is used to import and augment records from departmental databases. Each record in the submission buffer is checked, edited and completed by library staff before being added to the live repository.

Title, author(s), type and year fields are regarded as essential for all items. For most records, the following fields are also required: title of journal, book, conference or equivalent (in which the item will appear), the journal volume and number, where applicable, and an official URL, which is regarded as especially useful where the full text is not held in Strathprints. An abstract and full text are regarded as highly desirable; locating and adding them is an important task for cataloguing staff. The University department (of the first author) and the subject classification (LCC) are mandatory and are added during bulk upload or by cataloguing staff. Other fields that are standard in Eprints are added if the metadata is readily available (page numbers, ISSN etc) but are regarded as less useful. Uncontrolled keywords are often added but their quality and value is questionable.

**Developmental phases**

Approval to proceed with an official institutional repository was given by the University's Head of Information Resources (Professor Derek Law) in May 2005. The task was assigned to an existing part- time member of CDLR staff (Alan Dawson). University approval was given for a two-year post of Institutional Repository Coordinator. A server was purchased and installed in June 2005, Eprints was installed and configured, and the first (genuine) record was submitted by a member of CDLR staff in July 2005. A small informal steering group of five people was convened in September and the first meeting held. The repository was open for registration, usage and harvesting in October 2005, with no publicity other than word of mouth. The Institutional Repository Coordinator (Alan Slevin) began work in November 2005, based in the University Library. A second steering group meeting was held, a service name chosen and a basic inclusive collection policy agreed. A development archive (Strathdev) was created in March 2006 (using the same installation of Eprints), to run alongside the main archive and enable testing of new interface designs, bulk imports and configuration changes such as the departmental browse interface. Strathdev was very useful initially but is only used now for testing occasional configuration changes.

**Institutional embedding**

Support and enthusiasm from a senior member of staff (Derek Law) has been important. Appointment of a full-time Institutional Repository Coordinator was a crucial step. When the initial two years expired in November 2007, this post was converted to a continuing one. By the time the first article about Strathprints appeared in the internal University newsletter, the repository already had 1000 records, and an award was given by the Principal to the depositor of the 1000th item. Presentations have been given to Library staff to ensure that Strathprints is viewed as an increasingly important new collection alongside other information resources, and the prominence of links to Strathprints on the Library and University websites has been enhanced to reflect this.

**Faculty engagement**

There was little or no general publicity for the first year of operation, but the IR coordinator contacted faculties and departments individually as part of his advocacy role. This encouraged several departments to supply documents, spreadsheets and databases of publications, though the metadata in these was patchy and never included abstracts or full text, so each one required metadata cleaning and enhancement. The departmental browse structure (added in September 2006) also helped, as it displays the numbers of records belonging to each department. The inclusion of Strathprints records in Google Scholar has been useful.

Although the IR was not used to host the RAE collection, Library staff have worked closely with the RAE team to ensure the metadata was accurate. This had the bonus of ensuring access to the RAE metadata. General awareness of the download statistics in Strathprints and speculation over the new metrics system to replace the RAE has also resulted in more formal contacts being established with some departments, including Mechanical Engineering, Physics and Photonics. Departmental research managers have made more formal arrangements to transfer their metadata and author final drafts to the IR coordinator on a regular basis. This is an encouraging development although the deposit process is still mediated.

**Policy formulation**

All deposits are added to the submission buffer, and only cataloguing staff may move them to the main archive, after they have checked each record and URL, added abstracts and other missing fields, and tried to obtain the full text (usually the author's final draft). This policy has been in place since day one and there are no plans to change it. Most other policies have been reactive, i.e. we decided to just go ahead and deal with issues as they arise rather than spend time worrying about potential problems in advance. For example, cover sheets for full-text PDF documents were added after about a year of service operation. These show the university affiliation and logo, copyright statement and usage policy. The metadata, data, content, submission and preservation policies were adapted from available Eprints templates, and a Strathprints Notice and Takedown Policy has been developed.

We have kept user registration open to all, and occasionally get rogue users registering (e.g. one recently with username 'Free Porn') which are simply deleted. We have recently changed selected user profiles so that they can edit their own records after submission, once we had found out how to do this in Eprints.

**Service sustainability**

Costs are kept low. Hardware cost £600, software is free. Only one member of staff works full-time on Strathprints; support and cataloguing staff fit in Strathprints work along with other duties. Periodic link-checking and de-duplication takes place, and several duplicate records have been deleted. Support from the Eprints team has been occasional but very useful, either via the mailing list archive or responses to direct email enquiries. The IR Coordinator attended the Eprints training course in February 2006. Migration to Eprints 3 is regarded as a significant step and a commitment to continued usage of Eprints, at least in the short term. This is expected to take several days work and is planned for the first half of 2008.

**Measuring and demonstrating success**

Interest from academic departments has grown steadily over two years, partly stimulated by the RAE. Usage statistics have been very important in demonstrating substantial and increasing usage of Strathprints. The Eprintstats package was installed in September 2006 and has worked very well, failing just once in 18 months. In the first half of 2007 there were over 182,000 abstract accesses and 28,200 downloads, an increase of over 500% on the same period in 2006. The statistical package has been an important tool in advertising the repository, particularly in demonstrating to academics the increased downloads where full-text access to author final drafts are available.

**Key challenges faced**

At an early stage we tested uploading records in bulk from departmental databases, as it seemed unlikely that reliance on individual voluntary deposits would be productive. This required a little development work, e.g. an Access module to convert a single field of multiple authors into separate author names, and to separate forenames and surnames, as required for importing into Eprints. Another module was written to generate files in Eprints XML format from Access. This process has worked very well, but metadata quality and consistency in departmental databases remains a significant issue. Invalid XML characters, such as smart quotes and long dashes, have been a minor but persistent nuisance.

As with most IRs working with no deposit mandate, the process of ensuring that full-text author final drafts are available in the repository has been difficult. The familiar problems of making some academics comfortable with the issues surrounding open access and copyright have been evident. The reluctance to change working

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* shallow (only the top levels of LCC are used), so becomes less useful as more records are added. Additional LCC subjects have been added in selected subject areas with large numbers of records, e.g. physics and some social sciences.
* Theses: There is currently discussion about how to handle theses, e.g. whether to join Ethos, about print and/or digital submission, how to enforce a deposit mandate, and whether to use Eprints or different software.
* Advocacy: With no institutional mandate for deposit in Strathprints, current advocacy efforts may only take the service so far in terms of full-text deposit of author final drafts. Therefore, certain departments where a good relationship has been developed, or who have a particular interest or expertise in developing departmental digital libraries, may continue to be the most enthusiastic contributors to the repository.
* Integration with departmental websites: This is starting to become an issue as some departments are generating websites and lists of publications from the university content management system, which is quite separate from Strathprints. This relates to wider University policy on a post-RAE integrated research information system.
* Interoperability with the University VLE: This is not an issue as yet but may become one in future.

**Conclusions**

It is not a bad idea to dive in and get on with it as long as there is some institutional support and initial costs are low. Eprints is ideal for this as it is freely available, relatively easy to install, reliable and highly configurable. It is possible to get a functioning repository up and running in a couple of weeks. The ability to interrogate (and occasionally update) the underlying MySQL database directly has been very useful, e.g. in extracting the figures for this report.

### 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.

### 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?

#### 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"[1](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n1)
* *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"[2](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n2)
* *Home Grown*: "in house software development"[3](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n3)
* *Digital Asset Management System (DAMS)*[4](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n4): "software that supports the ingest, description, tracking, discovery, retrieval, searching, and distribution of collections of digital objects"[5](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n5)

### 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.[6](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n6) 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.[7](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n7) DeRidder refined the DAMS evaluation process further by encouraging others to conduct a formal needs assessment.[8](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n8) 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.[9](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n9) 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[10](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n10). 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."[11](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n11) 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.[12](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n12) 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.[13](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n13)

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.[14](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n14) 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.[15](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n15)

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.[16](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n16) Originally, the LCDL was built in CONTENTdm.[17](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n17) 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.[18](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n18) 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).[19](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n19) 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.[20](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n20) 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.[21](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n21)

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.[22](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n22)

In 2010, Archives New Zealand (ANZ) was charged to develop and implement a Government Digital Archive.[23](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n23) 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[24](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n24), ANZ decided to use that system as their final DAMS for preservation.[25](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n25) In 2008, ANZ implemented Fedora Commons as an interim solution since planning for a "complete digital preservation system" was already in progress.[26](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n26) 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."[27](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n27) 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.[28](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n28)

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.[29](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n29) 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.[30](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n30) 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."[31](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n31) 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.[32](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n32) 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.[33](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n33) 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.[34](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n34)

**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:* Vendor technical support
* Inaccurate search results in DAMS
* License and maintenance fees
 | Proprietary to Open Source |
| State Library of North Carolina | OCLC's Digital Archive | DuraCloud | Dissatisfaction with:* Upload limits and requirements
* Item discoverability in DAMS

Want to keep:* Report features
* Fixity check
* Virus scans
 | Proprietary to Open Source |
| Florida Council of State University Libraries | CONTENTdm, DigiTool, SobekCM | Islandora | Want increased:* Robustness
* Scalability
 | Multiple Proprietary & Open Source to Single Open Source |
| Texas Tech University | CONTENTdm | DSpace | Dissatisfaction with:* Search Engine Optimization (SEO) rankings
 | Proprietary to Open Source |
| Indiana University | Variations | Variarions2 | Want increased:* Content type support
* File format support
* Metadata expansion
* New features and capabilities
 | Home Grown to Home Grown |
| Archives New Zealand | Fedora | Rosetta | Dissatisfaction with:* Limited DAMS functionality
 | Open Source to Proprietary |
| J. Williard Marriott Digital Library at the University of Utah | CONTENTdm | Hydra | Want increased:* Scalability
* Robustness
* Community support
* DAMS customiazation
 | Proprietary to Open Source |

### 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](http://www.dlib.org/dlib/september15/stein/Survey_Printout.pdf)". The survey was created and delivered with the Qualtrics survey software, which utilized survey flow[35](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n35) and skip logic[36](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n36) 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.[37](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n37) 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,[38](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n38) Hoe-Lian Goh, *et al*.,[39](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n39) Marill and Luczak,[40](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n40) and Andro, *et al*.,[41](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n41) 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[42](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n42)
* 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 |
| **Total Responses** | **49** | 99[43](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n43) |

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 |
| **Total Responses** | **49** | 100 |

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 |
| **Total Responses** | **49** | 100 |

#### 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 |
| **Total Responses** | **56**[**44**](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n44) | **102**[**45**](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n45) |   |

**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 |
| **Total Responses** | **56** | 100 |

**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 |
| **Total Responses** | **51**[**46**](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n46) | **101**[**47**](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n47) |   |

**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 |
| **Total Responses** | **51** | 101[48](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n48) |

#### 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[49](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n49). | 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.

**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.[50](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n50)

#### 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,[51](http://www.dlib.org/dlib/september15/stein/09stein.print.html%22%20%5Cl%20%22n51) 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,[52](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n52) 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.[53](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n53)

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.[54](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n54) 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[55](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n55) and Kuali OLE[56](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n56), that native linked data library systems became readily available. Even between these two systems, only Fedora 4 can function as a DAMS.[57](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n57) 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[58](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n58), 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.[59](http://www.dlib.org/dlib/september15/stein/09stein.print.html#n59)

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,[60](http://www.dlib.org/dlib/september15/stein/09stein.print.html%22%20%5Cl%20%22n60) 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.

#### 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*

### 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.

#### 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.