

# Strategic Library™



Issue 63 // June 15, 2019

## One of the Hardest Patron Conversations For a Library Supervisor to Have?

» Preparing For the “Hygiene Talk”

BY DR. STEVE ALBRECHT

**S**o a patron has – for whatever reason and there can be many – a significant body odor, dental odor, or other hygiene problem. This is not a patron who rode his or her bike to your library and didn’t towel off properly; this is a person who we can all smell from several feet away. It could be a combination of body odor, mouth odor, a personal toiletry problem, and/or unclean clothes (wearing the same unwashed garments day after day). Either way, this a library workplace issue, which can really start to bother the staff who have to serve or work near this person. It demands a “patron coaching” conversation.

There are times where a patron coaching discussion is a useful intervention tool for library supervisors, to address chronic Code

of Conduct violations and/or library-use issues. Hygiene, or the lack thereof in this case, falls somewhat in the middle of these two corrective areas. It’s not a life-threatening safety or security issue, but it can certainly gain momentum left unheeded.

The question that can arise with some library supervisors is, “When do I have the right to discuss a hygiene issue with a patron?” The answer is, “When it impacts the business of your library in a negative way.”

While we don’t want to pry into patrons’ personal lives, we do have the duty and obligation as supervisors to address patron-use issues or eccentric behaviors that make it hard for all employees to serve other patrons around the person who smells bad, or do their jobs with or for the body odor-offending patron.

In their 2011 bestselling book *Crucial*

### WHAT DO HIGH SCHOOL STUDENTS KNOW ABOUT INFORMATION LITERACY?

*A Case Study of One University’s Feeder Schools*

### EMORY UNIVERSITY’S CHANGING ATLANTA EXHIBIT

*Documenting Local History through Archives*

### WHEN A REPOSITORY IS NOT ENOUGH

*Redesigning a Digital Ecosystem to Serve Scholarly Communication*

Conversations, Kerry Patterson and his three co-authors discussed how to talk about tough topics with anyone, at home, at work, or in life. They define “crucial conversations” as those where: “opinions vary, the stakes are high, and emotions run strong.” A hygiene conversation with a patron certainly qualifies as all three.

Seeing the hygiene conversation as “crucial” can help you shape this important and hard discussion as not about picking on the patron, but rather, keeping the focus centered on what the patron does or doesn’t do, should do differently, and how the issue at hand impacts the library’s business in a negative way.

Once the supervisor gets the patron’s commitment to change (a key goal), the patron should begin to follow the agreed-upon solution immediately. Any “business impact” discussion should include the consequences for non-compliance, which could mean the possibility of patron discipline. It’s hard to kick a patron out of the library for smelling really bad, but where do you draw the line for what you or other employees or patrons will tolerate?

The key is to focus on the patron’s impact on the library, and not use demeaning labels (“Gee, you stink”) to describe what are actually behaviors, with a variety of behind-the-scenes reasons for them. This calls for a quiet intervention that is understanding, firm, fair, reasonable, and consistent, so the supervisor and the patron can (hopefully) get through this crucial and highly-sensitive conversation successfully.

Back to the patron with the hygiene issue. As a rule, most hygiene problems have a foundation in four possible areas:

1. a medical problem (excessive sweating,

sleep apnea, or as an adverse reaction to certain medications).

2. a stress or mental health issue (most often depression, or not caring about personal self-care, that may come from post-traumatic stress disorder, an obsessive-compulsive disorder, delusional thinking, hoarding behaviors, or a disconnection from reality).
3. a revenge issue (wanting to retaliate against another person, i.e., “I won’t bathe and I’ll wear these same clothes every day for a week; that’ll show them!”).
4. either unaware; doesn’t care; or aware of the impact on others, but doesn’t know how to fix it: the patron who always exercises at lunch and doesn’t shower afterwards before coming to the library; a patron who believes he or she has the “right” to offend others by smelling bad; or a person experiencing homelessness who doesn’t have regular access to shower or laundry facilities and has become accustomed to the odor.

The following suggestions can help the concerned (but reluctant) library supervisor to address a patron’s hygiene problem. You don’t have to read this word for word to the patron; just pick out the themes that work best for you and the person or his/her hygiene concerns in question.

Supervisor: “If you have a minute, can I talk to you in private about an issue? This is an uncomfortable yet necessary part of my job. As hard as this is to talk about, I have some concerns that your body odor and/or soiled clothing is making it hard for other people to be around you. I’ve seen for myself that it’s affecting others in a way that’s not good for you or our library. I’m sure it’s embarrassing for you and it’s not my intention to make you feel worse. I don’t know whether you’ve faced this issue before, but if you have, can you tell me what kind of solution has worked for you?”

**MEDICAL REASON:**

“I’m not here to pry into your personal life and I don’t want or need to

know any details from you, but sometimes hygiene problems come from a medical issue you’re facing or a medication you’re taking. If you have a medical reason for this problem, please let me know how we might accommodate you.”

**STRESS OR MENTAL HEALTH REASON:**

“I know that sometimes we all face serious stressors like depression, sadness, or not having regular access to a shower that can make it difficult to take good care of ourselves every day. Again, I don’t want to know any details, but if you’re having some personal stressors, I can refer you to a county counselor or social worker. It’s completely confidential; no one will ever know you have contacted them. I brought one of their phone numbers to leave with you just in case you might want to speak to a qualified helping professional when you’re alone.”

**REVENGE REASON:**

“Sometimes we have conflicts with people over small things that turn into big things. We can agree that you don’t have to like or even engage with anyone you come into contact with here, but we all have to co-exist here. If you have problems with anyone and can’t work it out with him or her first, please come see me, and I’ll address it with you.”

**UNAWARE REASON:**

“I know you like to exercise before you come here. Can you make sure that you take a moment to clean yourself thoroughly before you come in?” or “If you need access to laundry or shower facilities, let me see what I can do for you.”

Keep in mind that your success level for this type of difficult, crucial conversation varies as to the level of sobriety, mental acuity, maturity, or sense of either ownership or outrage that the patron has while you bring up this always-touchy subject. This is one of those life issues that can self-correct itself, but it may require you to give it an empathic nudge in the right direction. ■

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# What Do High School Students Know About Information Literacy?

## » A Case Study of One University's Feeder Schools

BY MELISSA CORRELL

### INTRODUCTION

Students begin college with a wide range of experiences, competencies, and attitudes around information. Academic librarians often do not know what students have learned about research and information literacy (IL) in high school, which can be a challenge for those who teach first-year students. This localized study contributes to the body of literature on the topic of IL and the transition from high school by serving as a case study of one small, private, suburban university's students' experiences with libraries, librarians, research, and IL instruction prior to enrollment. Having a sense of incoming students' baseline IL skills and level of exposure to IL concepts can help librarians who work with first-year college students to tailor instruction to more effectively help students build on existing knowledge, develop skills, and think about information and research in more sophisticated ways.

### LITERATURE REVIEW

Studies show that many students enter college with low levels of IL (Foster, 2006; Gross & Latham, 2009; Saunders, Severyn, & Caron, 2017; Smith, Given, Julien, Oullette, & DeLong, 2013). One factor contributing to this low level may be students' experiences with libraries and IL instruction in K-12, which tends to be inconsistent both between and within school districts. In their survey of more than 375 first-year students at a small honors college, Douglas and Rabinowitz (2016) found that, while in high school, 79% of students borrowed library materials, 67% had used a library database, and 64% reported receiving a lesson from a librarian. However, students often receive IL lessons in a fragmented way, and these lessons may not be reinforced throughout their academic



careers (Crawford & Irving, 2007). Many schools do not have a library, and others may have a library but no librarian, relying instead on teachers, staff, or volunteers to run the library. Even in schools that do have a library and a librarian, some students may not receive IL lessons, and those that do may not value those lessons or retain what they learned. In their survey of incoming first-year students, Gross and Latham (2007) found that, regardless of GPA, respondents said they taught themselves information skills and were just as likely to say they learned IL skills from a friend or classmate as from a school librarian.

Even in high schools where a librarian provides IL instruction, there may be a gap between skills taught in high school and skills needed for a student to successfully perform college-level research, and students may have difficulty transferring these skills as they transition to college (Saunders, Severyn, & Caron, 2017; Varlejs & Stec, 2014). Moreover, students with low levels of IL proficiency tend to overestimate their abilities as researchers (Gross & Latham, 2007; Gross & Latham, 2009; Gross & Latham,

2011; Latham & Gross, 2008; Saunders, Severyn, & Caron, 2017), and faculty tend to assume that students are better prepared for college-level research than they actually are (Smith et al., 2013). Both faculty and students find that the level of research and IL instruction provided in high school is insufficient to prepare students for their college research projects (Gross & Latham, 2007; Head, 2013; Saunders, Severyn, & Caron, 2017; Taylor, 2012). Understanding where students tend to need the most remediation can help academic librarians provide effective instruction early in a student's college career.

Some librarians have worked to address this gap by hosting visits to academic libraries for high school students, usually in the context of a class; one such program is the Informed Transitions (n.d.) program at Kent State University. Others have studied high school students directly, such as Julien and Barker (2009), who asked 11th and 12th graders to complete skills-based tasks and followed up with interviews to gather information about their affect and mindset. Additional work seeks to study the research and IL skills students will be expected to have when they begin their first year of college, either by interviewing or surveying faculty who teach first-year students (Dawes, 2017; Jackson, MacMillan, & Sinotte, 2014; Raven, 2012) or by reviewing syllabi or assignments (Donham, 2014; Oakleaf & Owen, 2013). Others, such as Rollins, Fonseca, Fontenot, and Seidel (2013), have facilitated conversations between academic librarians and school librarians to help each group better understand what students learn and what they are expected to do at each level. This study seeks to add to the body of literature around the IL gap between the last year of high school and the first year of college by examining the local context for students entering one university.

### Average of Librarians' Ratings of Student Skills

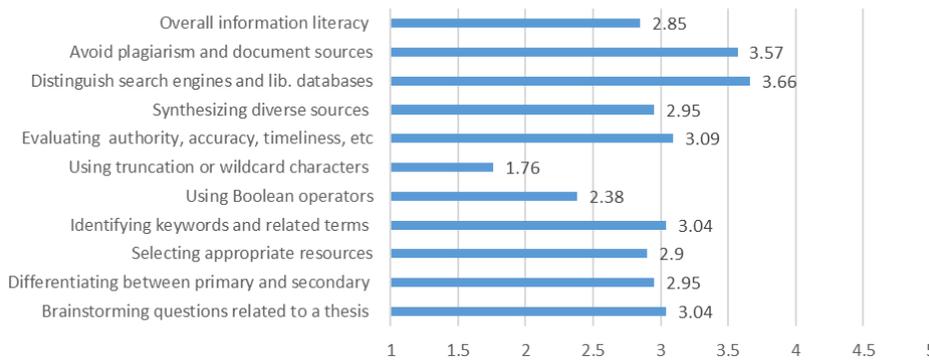


Figure 1 Librarians' Ratings of Students' Skills

### METHODS

In order for the librarians at Arcadia University to have a better understanding of our first-year students' experiences with research and IL, I surveyed librarians at our top 50 feeder high schools and followed up with semi-structured phone interviews. To identify the university's top 50 feeder high schools, I reached out to the enrollment management office, who shared a College Board document that identifies those schools. In 12 instances, the school's website did not help me identify the librarian or media specialist to contact at that school, so I called the school's main office. While two of these calls yielded librarians' names and contact information, 10 schools did not employ a librarian or media specialist. Three of these schools had no library at all; the others had a space containing books and computers, staffed by volunteers or operating on the honor system.

To gather context about the schools that did have a library and a librarian, I adapted a survey from Nix, Hageman, and Kragness (2011) to ask respondents about what they teach and their perceptions of students' research and IL skill levels after four years of high school. The original survey gathered the IL experiences of students who at-

tend parochial high schools. For my study, I shortened it, focused it on IL, and tailored it to my own institutional context (Appendix A). I omitted questions about libraries' equipment, where high school graduates enrolled in college, and librarians' estimate of the percentage of time spent on different responsibilities. I also added questions that asked librarians about teaching, assessment, and collaboration with classroom teachers, and one question that asked if librarians teach search strategies for Google. I created the survey using the Qualtrics platform and distributed it by email, following up with a reminder to those who did not complete the survey after two weeks. Of the 40 librarians I was able to identify at our top 50 feeder schools, 21 responded (52.5% response rate). The survey invited participants to indicate if they would like to be contacted for a follow-up phone interview. These semi-structured interviews used a common set of questions while allowing for conversation to develop organically (Appendix B).

### LIMITATIONS

The local and highly qualitative nature of this study, combined with the very small sample size, mean that the results of this study are not generalizable. Additionally,

taking interview notes by hand rather than recording phone interviews could have introduced researcher bias. However, this study could provide a model that could be useful for other universities who wish to study incoming students' experiences.

### FINDINGS

All survey respondents were full-time school library employees, and all but one were state-certified, degree-holding school librarians or media specialists. The respondent who was not a librarian was a teacher, and explained:

*All librarians were laid off four years ago and our library went unused for one year. I moved my office into the library so that the space and computers could be used. There is no budget, no official library staff. It is a meeting area and a place with computers only. We do not even have a working printer. There are no databases. (Survey comment)*

More than three quarters of the respondents were the only librarian employed by their high school, though most had one or two support staff in their library. All but two of the respondents reported that IL instruction is in their job description. However, of the 21 survey respondents, only eight reported that their school had a formal IL curriculum or formal IL learning outcomes, while 10 reported that their school had none, and three reported informal outcomes or integration of IL in the English Language Arts curriculum. All but one of the respondents reported that they instruct students how to use their library's subscription databases, while only 11 reported that they teach students search strategies for Google. None of the respondents use a standardized assessment tool to measure students' performance on IL tasks, but three reported using an informal assessment they developed to gauge student learning.

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Several noted they rely on observations of students and feedback from teachers to get a sense of both student learning and their own performance as IL instructors.

The survey asked librarians to use a five-point Likert scale to rate students' skill level in several aspects of research and IL. A score of 1 indicated "not well at all," 3 was labeled "proficient," and 5 was labeled "expert." Results indicated that, on average, these high school librarians rated their students' overall IL levels as slightly less than proficient (2.85) by the time they graduate. Interestingly, librarians gave students higher ratings in all but two of the individual skill areas. Students received the highest ratings in distinguishing between online search engines and subscription databases (3.66) and avoiding plagiarism and documenting sources using an appropriate citation style (3.57). Librarians were more critical of students' abilities to use advanced search techniques such as Boolean (2.38) and truncation and wildcard characters (1.76). In fact, 85% of respondents said that students used truncation and wildcards "slightly well" or "not well at all."

After the survey, I conducted semi-structured interviews with seven participants, taking notes by hand and capturing direct quotes whenever possible. All of the participants were librarians or media specialists from schools in Pennsylvania or New Jersey, representing six public schools and one private Catholic high school. All but one worked as a solo librarian, and the schools ranged in size from approximately 1,200 to 3,100 students. The interview questions focused on the types of assignments for which teachers request research and IL instruction, librarians' experiences collaborating with teachers, what the librarians typically teach, and their overall assessment of their library's instruction program. Taken together, the survey responses and the interviews revealed common themes that characterize issues in high school IL instruction at the local level, which are listed here and discussed in more depth below:

- Instruction is not universal
- Instruction is uneven for students on different academic tracks
- Lack of collaboration and teacher resistance
- Concern that teachers themselves lack IL skills
- Prescriptive assignment design or a lack of research assignments
- Students' unsophisticated approach to



searching and uncritical, transactional approach to selecting and using information resources

- Lack of skills transfer between assignments and between grade levels

## DISCUSSION

### ***Instruction is not universal***

All of the librarians surveyed and interviewed said that they see students most often in the context of their English Language Arts (ELA) courses. This is unsurprising as Pennsylvania has adopted the Common Core State Standards, which, while not using the term "information literacy," includes research and IL skills in the ELA standards (Pennsylvania Department of Education, 2014). Only two of the librarians reported that their school requires research and IL instruction with the librarian in ELA. One additional librarian noted that a lesson in the library is required in the Freshman Seminar course; however, this lesson is focused on how to physically get to the library, a tour of the space, and a brief introduction to the library catalog. Generally, it does not cover IL concepts. The remaining four librarians interviewed all reported that teachers arrange for lessons for their students at will, and one librarian described the instruction at her school as "haphazard." Another librarian mentioned that she collaborates with some teachers and never sees others. As such, some students are completing high school without ever receiving a lesson in research and IL from their school librarian.

### ***Instruction is uneven for students on different academic tracks***

The interviews revealed that freshmen and sophomores are more likely to receive IL instruction than juniors and seniors. Furthermore, interviews echoed research that finds that instruction is provided differently, depending on students' academic track, with

students in more advanced classes receiving more instruction centered on higher-order thinking skills (Fabbi, 2015). Students in honors and advanced placement (AP) courses are more likely to receive instruction than students in general education or remedial courses. IL expectations differ for students on different academic tracks as well. One librarian explained that for a particular assignment, AP students are asked to select a website to use as a source and have it vetted by a teacher, while in the same course at the college preparatory (CP) level, students are allowed to use "any source" and the assignment does not include an evaluation component. While college-bound students need to practice research and IL skills, these skills are important for all students to prepare not just for academia but also for their personal and professional lives.

### ***Lack of collaboration and teacher resistance***

Finding time to teach IL skills seems to be a challenge universally familiar to instruction librarians, and the high school librarians participating in this study shared the same sentiment. Some mentioned that being the only librarian in a school of thousands of students made seeing each student impossible and explained their efforts to make instructional videos available. A few librarians also stated that teachers can be reluctant to collaborate with librarians and/or devote class time to IL instruction. In response to the survey, one librarian wrote "I have teachers who tell their students to just go to Google and find appropriate sources but push back when I ask to show their students the databases. It seems like I have to fight every year to meet with the students." In a follow-up interview, this same librarian explained that there is an assumption that the teachers are providing IL instruction to their students in their own classrooms. However, this librarian suspected "...that's what they say, but in truth, they're not." Other librarians also explained they think teachers are providing IL instruction in their own classrooms, but they do not know what the content of such lessons might be. Recognizing this, one librarian said "My involvement with students is rather hit or miss. I work to train the teachers to in turn train the students." Another librarian worried that teachers would be unlikely to provide instruction in the same way that a librarian would, relaying instead what they learned as a student, which may be outdated or less relevant to the school library's resources.

### **Concern that teachers themselves lack IL skills**

Compounding the problem of not knowing what, if anything, teachers are teaching their students about research and IL, three of the librarians interviewed expressed some concern that the teachers themselves may not be information literate. One mentioned that the teachers were unfamiliar with the library's databases, so she provided in-service training for all teachers in her district. Another was concerned that teachers were not proficient in their abilities to evaluate information found on the open web and would not be able to guide their students in source evaluation. The same librarian reported that she provided training for teachers in her district on how to create citations for non-print sources after she found out that some teachers had been telling students that they didn't need to cite images. A third expressed some doubt that the teachers at her school knew how to research and write a traditional research paper. Research seems to support the notion that teachers may themselves have low IL, such as a recent study at one university that found that fewer than half of teacher education students who participated in a standardized IL assessment met or exceeded the cut score (Godbey & Dema, 2017). As these authors point out, part of the challenge in helping preservice teachers develop IL skills is the fact that the latter years of teacher education programs put much more emphasis on practice and student teaching than on writing research papers, and students tend to associate IL only with finding sources (Godbey & Dema, 2017). It is possible that developing techniques to make IL more visible to preservice teachers throughout the course of their studies might help them to be more aware of their role in teaching, or



at least reinforcing, IL concepts in their own classrooms.

### **Prescriptive assignment design or a lack of research assignments**

A few interviewees mentioned their schools seem to be moving away from assigning the traditional research paper, opting more toward deliverables that involve technology, such as presentations, infographics, and podcasts. When research is required for an assignment, the guidelines are sometimes problematic. For example, when students are told they cannot use sources from the open web, they miss an opportunity to practice source evaluation skills to select an appropriate resource. The same is true when they are provided with a list of vetted websites to use, or if, conversely, students are told they are allowed to use any source and do not receive feedback or grades based on the quality of the sources they cite. As many

studies show, students tend to deemphasize source evaluation (Gross & Latham, 2009; Gross & Latham, 2011; Taylor, 2012) and value convenience over quality (Connaway, Lanclos, & Hood, 2013; Gross & Latham, 2011; Parker-Gibson, 2001). This habit likely leads to students choosing inferior sources, simply because they found them quickly.

Students' unsophisticated approach to searching and uncritical, transactional approach to selecting and using information resources

The Pew Internet and American Life Project found that students have a transactional view of research as a task requiring them to find just enough information to complete an assignment (Purcell et al., 2012). In fact, as Thomas Mann (1993) pointed out with his Principle of Least Effort:

*Most researchers (even 'serious' scholars) will tend to choose easily available information sources, even when they are objectively of low quality, and, further, will tend to be satisfied with whatever can be found easily in preference to pursuing higher-quality sources whose use would require a greater expenditure of effort. (p. 91)*

Valentine (1993) confirmed this tendency to sacrifice quality for convenience in her study of undergraduates who, although they had jobs in the library, struggled with using the library, did not want to ask librarians for help, and stuck to sources or methods they thought of as easy or familiar with the goal of getting their research done as quickly as possible. This issue is longstanding, and contemporary students' preference for convenience can only have been exacerbated by their lifelong reliance on Google.

However, the popular assumption, which the students themselves also share,

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that students are good at using Google simply by virtue of being born in a world in which it has always existed, is simply untrue. One librarian said in her interview that she is “not so confident they really know how to search on the internet.” She described students’ “natural behavior to type in the search bar exactly what they are thinking,” often a complete sentence or question. She provided an example of a student who typed the question “Why did John F. Kennedy win the Nixon-Kennedy debates in 1960?” into Google’s search bar, and became frustrated when an answer was not instantly apparent on the results page. Project Information Literacy found that first-year college students struggled with developing keywords when searching for information in library databases (Head, 2013). Providing high school students instruction on how to parse out the main concepts of a topic and use Google to generate keywords could help students improve their search habits and results using any search platform.

After struggling with what to type into a search bar, students often struggle with selecting which sources to use. Two of the librarians interviewed mentioned that students have difficulty separating legitimate sources from sensational, fanatical, or conspiratorial sources, with one librarian giving the example of a student struggling to determine the accuracy of health information and another relating an example of a student who believed the earth is flat because NBA star Kyrie Irving says so. While this surprised me, it aligns with Dawes’s (2017) finding that faculty who teach first-year college students report they have a tendency to equate celebrity with authority. A third interviewee explained she uses a survey after lessons that is “revealing that [students are] not worried about quality. They’re worried about just getting the information and being done.” In a survey response, one librarian reported that “secondary level students in



general are very lazy when it comes to the research process. They don’t take the time to really think about what needs to be accomplished to be successful. They are prone to choosing the first thing that comes up.” While students may be naturally inclined to expend the least amount of effort possible, their overreliance on Google likely reinforces this uncritical, consumeristic approach to information.

***Lack of skills transfer between assignments and between grade levels***

Occasional IL instruction may not be enough to ensure that students have a proficient level of IL when they graduate high school. In their survey comparing high school and college librarians’ perceptions of students’ IL skills, Saunders, Severyn, and Caron (2017) found that high school librarians consistently rated students more proficient in individual skills than college librarians did. The authors explain that one possible reason for this incongruence could be that, if students are learning these skills

in high school, they are “simply not remembering or transferring” them once they reach college (Saunders, Severyn, & Caron 2017, p. 282). The high school librarians in this study would add that students have trouble transferring skills between grades and even between assignments. In both the survey responses and the interviews, librarians expressed frustration that even after receiving instruction and successfully using the library’s databases, students revert back to using Google in an uncritical manner when searching independently. One librarian wrote in response to the survey, “Continually I am amazed at students’ lack of ability to transfer knowledge from one task to another in the future.” Another said in an interview, “It’s amazing how many 10th graders act like they’ve never seen a catalog before.” Students need support and guidance to understand how research and IL skills they learn from librarians both build on what they already know and can be used in different contexts, in school, the workplace, and their personal lives.

**CONCLUSION**

The findings in this small, local study confirm the general conclusion represented in the literature that students often graduate high school and enroll in college with less-than-proficient IL levels. A variety of factors conspire to thwart the efforts of high school librarians’ IL instruction efforts, including a lack of collaboration with or outright resistance from teachers; the assumption that teachers, who may not themselves be information literate, are teaching IL in their own classrooms; and the sheer number of students enrolled in schools that often employ no more than one librarian – to say nothing of the schools that have no librarian, or no library at all. However, it remains important for librarians to continue to advocate for opportunities to help students develop their IL skills. Additionally, students

 An advertisement for an eReader Carrier. On the left, there is a blue padded zipper bag with black handles and a black e-reader device. The background is a light beige color. The text is as follows:
 

**eReader Carrier**

Durable padded zipper bag protects from damage

**A. RIFKIN Co.**  
Established 1892

**Now in 2 sizes!**  
Ideal for lending Nook®, Kindle or iPad!

**Learn More**

need repeated practice using research and metacognitive skills in all four years of high school, not only freshman and sophomore years. High school librarians may find it useful to articulate an IL curriculum or IL learning goals for their school, which can be used as a tool to advocate for IL instruction time. Several states, including Pennsylvania, have model school library curricula which can serve as inspiration or a starting point.

Students tend to be weak in developing a search strategy and generating keywords, and the assumption that they naturally know how to do this because they have grown up in a highly connected world does not help them improve in these areas; perhaps focusing more direct instruction around those topics would better prepare students for searching both academic databases and internet search engines. Students need more practice with selecting high-quality resources and need to be able to transfer source evaluation skills between assignments as well as between academic, work, and personal contexts. In light of this, both high school and college librarians should provide more direct instruction, not only in using library databases but also in using search engines like Google to find quality sources. Students need guidance to understand that Google is a business and not a neutral platform serving up truth; librarians have an opportunity to help students understand that the search engine works on a proprietary algorithm that privileges some information and obscures others in a personalized manner. Likewise, students need guidance in understanding the contextualized nature of authority and to distinguish celebrity from expertise.

One impetus for this project was my own ignorance of, and desire to understand, the range of research and IL instruction experiences our first-year students have before they arrive at Arcadia University. This desire is reflected in the common theme in the literature that calls for high school and college librarians to communicate more about what students need to know and be able to do, and plan ways to reach those goals (Gerrity, 2018; Saunders, Severyn, & Caron, 2017; Varlejs & Stec, 2014). Surveying and interviewing librarians who work in schools from which this university routinely draws students has revealed that, even at the local level, students' experiences vary widely.

In pursuit of a more thorough understanding of our students' backgrounds, Arcadia University's library administered the

## Appendix A: Survey of Research and Information Literacy Instruction in High Schools

*Adapted from Nix, Hageman, & Kragness, 2011*

1. Consent Form for Participation in a Research Study Survey of Research and Information Literacy Instruction in High Schools
2. Are you a state-certified school librarian or school library media specialist (SLMS)?
3. How long have you been working as a school librarian or SLMS?
4. How long have you been a librarian or SLMS at your current school?
5. Are you employed full time or part time? If part time, how many hours per week?
6. How many certified school librarians or SLMSs work in your school library?
7. How many other paid employees work in your school library?
8. Does your library provide electronic databases for your students?
9. Do students have access to the library's electronic databases from home or outside school?
10. How many computers are available for student use in your school library or media center?
11. Please comment on how your library's budget has changed over the last three fiscal years.
12. Does your school have an information literacy curriculum and/or articulated information literacy learning outcomes?
13. Is instruction in your job description?
14. Do you provide formal research and information literacy instruction for students?
15. Do you collaborate with teachers to design information literacy lessons?
16. Do you teach students search strategies for Google?
17. Do you teach students search strategies for library databases?
18. Do you teach students how to evaluate sources?
19. Do you administer a standardized information literacy assessment instrument to students in your school?
20. What strategies do you use to assess how well your students have met your information literacy learning goals?
21. What subjects are most represented among classes brought to the library for formal instruction? Rank the top two.
22. What subjects are least represented among classes brought to the library for formal instruction? Rank the top two.
23. Tell us about your graduating seniors' level of preparation for college-level research. On a scale of 1 - 5, with 5 being expert and 1 being not at all prepared, how well prepared do you think most of the seniors at your school are to do each of these research tasks at the college level?
  - a. Brainstorming both broad and specific questions related to a thesis statement
  - b. Differentiating between primary and secondary resources
  - c. Identifying keywords, synonyms, and related terms describing an information need
  - d. Constructing a search query using Boolean operators (AND, OR, NOT, +, -) in a variety of online information systems
  - e. Constructing a search query using truncation or wildcard characters (\*, ?, \$) in a variety of online information systems
  - f. Evaluating the authority, accuracy, timeliness, and point of view or bias of a wide variety of sources
  - g. Synthesizing sources representing a wide variety of viewpoints
  - h. Distinguishing between online search engines and the library's subscription databases
  - i. Avoiding plagiarism and documenting sources using an appropriate citation style
  - j. Overall, how information literate would you say that most your school's seniors are at the time of their graduation?
24. You can use this space to share any additional comments or thoughts.  
Would you like to participate in a phone interview to follow up on this survey?

## Appendix B: Standard Phone Interview Questions

- You mentioned that your library has information literacy curriculum or goals. Can you tell me a bit more about that?
- Over the course of your time at your school, what trends have you observed regarding the kinds of assignments students are asked to do that involve research?
- What about trends in the types of resources they use to complete those assignments?
- What are the information literacy learning outcomes of a typical lesson with students, or that you generally try to teach?
- Can you describe an example of a time that you and a classroom teacher collaborated successfully to design and implement an information literacy lesson for their students?
- Overall, how would you characterize your level of collaboration with classroom teachers? Has that changed at all over the years?
- In what ways do you think your graduating seniors are best prepared for college-level research? In what ways are they unprepared?
- What do you wish you could improve about your school's information literacy and instruction program?

Higher Education Data Sharing Consortium's Research Practices Survey to incoming first-year students in the fall 2018 semester. The data gleaned from this survey will form a useful complement to what we have learned from high school librarians and allow us to begin to tailor our first-year instruction program to build on students' current knowledge and encourage the meaningful application and transfer of new skills. Opportunities for further research could include interviewing our first-year students and their instructors, which could provide a rich portrait of what our incoming students know and how they think about research and information when they begin college. ■

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# Emory University's Changing Atlanta Exhibit » Documenting Local History through Archives

BY W. MICHAEL CAMP

**A** current major theme in the promotion of archives is outreach to users beyond academia. Another important goal for most repositories is acquiring new collection material. By presenting the activities of archives in a visually stimulating way, exhibits of archival material are a useful way to both promote archival awareness and encourage placing of papers and records with archives. Events related to exhibits are a further way to promote the mission of the archive. This article discusses the Changing Atlanta exhibit displayed at Emory University as a case study to demonstrate how exhibits can spur greater public engagement with archives and archival materials. The exhibit used archival collections to illuminate the stories of individuals and groups who participated in the city of Atlanta's expansion in the 20th century. This article will discuss the historical content of the exhibit itself, along with the opportunities for outreach generated by the exhibit.

*Changing Atlanta, 1950–1999: The Challenges of a Growing Southern Metropolis* was on display in the Schatten Gallery of the Robert W. Woodruff Library at Emory University from March 22–June 19, 2016. It examined the perspectives and experiences of four distinct entities who affected—and were affected by—Atlanta's rapid and massive growth in the second half of the 20th century, as well as the city's emergence on the national and international stages. Created using the materials of four recently processed or in-process collections held at Emory's Rose Library, the exhibit was also designed with the goal of promoting the value of archival materials to nontraditional users. The exhibit moved chronologically from the 1950s through the 1990s, documenting the human experiences found within the large-scale processes of Atlanta's



geographic and economic change. It was curated by three historians and two archivists, which allowed the exhibit both to promote the value of archival collections and to put documents into the context of broader city histories. Two historians and two archivists each curated one of the four sections of the exhibit, based on the collection each had recently processed. I was one of these historian-curators, and at the time was a doctoral student in Emory's Department of History specializing in US political history. The third historian, a subject librarian at Emory University, provided comments and editing for the entire project, which provided someone sufficiently distanced from the day-to-day construction of the exhibit to be able to provide helpful input and tie all of the disparate parts together. The Rose Library's outreach archivist worked with the curators on digitization of material as well as sharpening the argument of each of the individual sections. Planning and executing the exhibit involved collaborations among several library units, including special collections staff, the library's exhibit team, development staff, and events staff. The exhibit began as part of a dissertation

completion fellowship project for the other historian-curator, a Department of History doctoral student specializing in the emergence of the Republican Party in the 20th-century Southeast. As part of his fellowship project, arranging and describing the papers of Atlanta tax lawyer Randolph Thrower, the fellow proposed holding a small exhibit using items found in the papers. Because the academic field of history is moving toward a greater focus on public history, the fellow wanted to gain experience in this field. During preliminary discussions with Woodruff Library's exhibit team in fall 2015, we found that a large exhibit area was open for use in the spring semester, and we decided to expand the scope of the exhibit to include four collections broadly covering Atlanta history in the second half of the 20th century. We decided to use the exhibit to tell some of the more local and personal stories embedded within this large-scale narrative of Atlanta's growth and expansion.

## HISTORICAL CONTEXT

Owing significantly to new initiatives in federal government policy, Atlanta's growth and development in the 20th century fol-



lowed many of the same patterns as other cities in the Sunbelt South. The creation of the Federal Housing Administration during the New Deal, which provided subsidized home loans in order to help restart America's construction industry, catalyzed Americans to buy single-family homes in unprecedented numbers and led to construction of suburban neighborhoods farther and farther from city centers (Hyman, 2011, pp. 56–66). During and after World War II, Sunbelt legislators steered huge amounts of defense and technology dollars to their states; in the case of Atlanta, the Dobbins Air Reserve Base in Marietta was established in 1941, providing stable employment to a number of Atlantans. In 1947, the anti-union Taft-Hartley Act allowed states to ban the “closed shop,” which required that laborers join unions as a condition of employment in factories.

Southeastern and southwestern states quickly established “open shop” conditions, luring manufacturers who preferred an environment less advantageous for organized labor. Americans from the Northeast and Midwest began migrating to the Southeast in order to take advantage of these new economic opportunities (Lichtenstein, 2002, p. 117).

Though long considered by many elite analysts—especially Franklin Delano Roosevelt's New Dealers—to be a backward and undeveloped region that was holding back the trajectory of the broader American economy, the stage was now set for the Southeast to undergo rapid change and



economic growth. It eventually caught up with and even surpassed the economic productivity of other US regions (Phillips, 2007, pp. 78–80). Atlanta was especially affected because of its central location in the region and its status as a transportation hub. Beginning with the creation of Eisenhower's interstate highway system in 1956, the ensuing decades witnessed the construction of I-75, I-85, I-285, and I-20 in and through the Atlanta area. The Atlanta airport, named after former Atlanta mayors William Hartsfield and Maynard Jackson, eventually became one of the busiest in the world. Local boosters worked especially hard to make sure that state and regional planning would be favorable to the city's fortunes, with the city's population and volume of economic activity both exploding (Allen, 1996, pp. 139–190).

Coca-Cola, a hometown company founded and headquartered near downtown, became one of the world's most powerful corporations, bringing national and international attention to the city (Pen-

dergrast, 2013, pp. 143–200).

However, while these processes unfolded, Atlantans also had to grapple with the long and tragic histories of racial inequality and violence endemic to the region. Civil rights protesters and Black Power advocates put pressure on city leadership to bring the city into alignment with the nation's moves toward greater racial equality (Brown-Nagin, 2011, pp. 1–16). Some Atlanta residents also questioned the virtue and necessity of untrammled growth, urging greater examination and consideration of what development and expansion would mean for the city's long-term prospects and its most vulnerable residents. These debates shaped the city's political development to the end of the 20th century and generated a voluminous amount of rich historical material for researchers.

#### EXHIBIT CONTENT

*Changing Atlanta* provided a window into these geographic, economic, social, and political changes. The four main sections



displayed archival materials that illuminated these stories. The four main collections highlighted were the Randolph Thrower papers, the John Sibley papers, the Community Council of the Atlanta Area records, and the Druid Hills Civic Association records. The first two sections documented stories of how Atlanta emerged as a modern city in the 1950s and 1960s by casting aside unfair political methods and bringing the city into line with national expectations on race relations. The latter two examined how Atlanta's subsequent growth affected two very different constituencies, urban minorities and suburban whites. All four sections mixed textual documents like brochures and correspondence with larger visual items such as campaign posters and fliers promoting neighborhood events, providing a balance of historical information and aesthetic appeal. Emory holds the papers of a number of other local leaders and organizations that we could have featured in the exhibit, but we decided to limit the exhibit to recently processed and in-process collections in order to highlight the activities of archives themselves. We also decided to de-emphasize the well-known figures of Atlanta history, such as Martin Luther King, Jr., in favor of other individuals and organizations whose papers were recently opened for research. This focus allowed us to show exhibit visitors the wide diversity of subjects available for archival investigation.

An accompanying timeline at the exhibit entrance traced some of the most significant moments and milestones in Atlanta's development, including the growth of the metropolitan population from 1 million in 1960 to 4 million in 2000, as well as the 1996 Olympic Games, which signaled the city's emergence as an international destination. The timeline, along with a short title

panel, helped tie the four disparate parts of the exhibit into a coherent whole by showing how each fit into a broader narrative of growth, development, and diversification.

The first section of the exhibit examined the 1956 congressional campaign of Atlanta tax lawyer Randolph Thrower. Thrower, best known for being forced by Richard Nixon in 1971 from his position as IRS chief for refusing to persecute Nixon's political enemies, ran for Congress as a Republican on the platform of doing away with Georgia's "county unit" system. The county unit system, which assigned electoral victories in Georgia primaries on the basis of numbers of counties won—not popular votes obtained—led to severe overrepresentation for very conservative rural areas. Racial demagogues like the notorious Eugene Talmadge, who resisted the progressive economic policies of the New Deal on the grounds that they would improve the economic standing of African Americans, dominated state politics in the first half of the 20th century. Thrower's congressional campaign, while ultimately unsuccessful, marshaled public opinion against the county unit system, which was eventually ruled unconstitutional by the US Supreme Court in 1963. The demise of the county unit system then permitted urban areas, especially Atlanta, to emerge as major political centers in the state. Thrower's campaign also helped begin to break the corrupt and decadent one-party Democratic rule that had dominated Georgia politics for decades, and was therefore an important turning point for Atlanta's role in state politics. On display were campaign brochures and correspondence with campaign supporters, among other documents. This section of the exhibit also included an interactive audio re-creation of Thrower's 1956 campaign song, entitled "Throw in with Thrower" (sung to

the tune of "Pop Goes the Weasel"), along with an interactive map displaying the dramatic changes in political representation wrought by the abolition of the county unit system. These materials were generated with the help of the Emory Center for Digital Scholarship. This section also included a voting booth on loan from the Atlanta History Center. The voting booth displayed the set of candidates that would have been on the ballot in Georgia in 1948 and showed exhibit-goers that they were all Democrats, providing a dramatic visual representation of how one-party rule allowed Democrats to dominate state politics until the 1950s.

The second section focused on the Sibley Commission, headed by lawyer John Sibley of Atlanta, who was also a prominent confidant to Coca-Cola CEO Robert Woodruff. The Commission, created to bring Georgia in line with the 1954 *Brown v Board of Education* decision, was established after a 1959 US District Court ruling declaring continued segregation in Georgia public schools unconstitutional. Because the *Brown* decision only prohibited state laws that mandated segregation, Sibley came up with two possible options for the state to pursue in order to preserve segregation as best as possible: to continue massive resistance by closing public schools altogether, or to create a "local option" that would permit individual school districts to decide whether or not to desegregate. Sibley and the commission held a series of contentious hearings across the state in spring 1960. Though 60% of witnesses at the hearings favored massive resistance and closing public schools, Sibley and other Atlanta elites knew that continued negative coverage from the national press would hurt the city's prospects for continued economic advancement, and tried to end massive resistance by any possible means. Sibley recommended the local option to the state legislature, which passed the plan into law in January 1961. Atlanta-area schools were soon desegregated, but other areas of the state were not. Though the Commission's action helped stave off the violence that had accompanied desegregation efforts in other southern states, the local option also meant that serious statewide efforts toward desegregation in Georgia would not emerge until later in the 1960s. On display were pieces of correspondence from Georgia constituents expressing alarm and anger at integration, which allowed visitors—especially younger ones—to grasp the intensity of racial tension in the

1960s, along with planning documents from the commission itself.

This section of the exhibit also included a 1960s-era desk on loan from Atlanta Public Schools. Some of the photographs in this section featured white and African American students sitting at similar desks during the era of desegregation, and the physical desk allowed exhibit visitors to get a closer look at this artifact in person.

The exhibit's third section covered the Community Council of the Atlanta Area (CCAA). The organization, formed in May 1960, provided technical information to individuals, civic groups, and human services agencies to help residents cope with rapid changes in the character of urban life. The Council worked on issues such as poverty, drug and alcohol abuse, daycare, employment and housing, recreation, and aging. It executed research and information dissemination services that culminated in the establishment of a public reference library. Of special concern to the CCAA was the transient hippie community centered on 10th and 11th Streets in Midtown, which often clashed with the police. Although the Council disbanded in 1974, other community groups adopted some its essential functions and continued to serve urban residents in the Atlanta area. On display were planning memoranda from Executive Director Duane W. Beck, handbooks, and research reports, among other materials.

This section also included a re-creation of The Great Speckled Bird, a counterculture newspaper published in Atlanta from 1968 to 1976, which was generated from past issues of the newspaper that are now held at Georgia State University. It contained several articles about events in Midtown Atlanta in the 1960s and 1970s, providing exhibit visitors a glimpse of the counterculture viewpoint about contemporary events of the period. The final section, the section I curated, examined the activities of the Druid Hills Civic Association (DHCA). Founded in 1938, the DHCA handles a variety of issues related to daily neighborhood life. It became especially active in the mid-1960s, opposing a state government plan to extend the Stone Mountain Freeway into downtown Atlanta, which would have cut through Druid Hills and a number of other historic in-town neighborhoods, such as Candler Park and Poncey-Highland. Though the state government condemned large portions of land in Poncey-Highland and cleared houses in preparation for construction, neighborhood



opposition, along with federal environmental regulations, stopped the project before it could be completed. The plan lay dormant for years before it was resurrected in the early 1980s, when Jimmy Carter desired freeway access to his presidential library in Poncey-Highland. Though the Presidential Parkway through Poncey-Highland was eventually built, neighborhood

opposition stopped the road from crossing Moreland Avenue and entering Candler Park and Druid Hills. As part of their protest, neighborhood residents camped out in public parks along the major

thoroughfare of Ponce de Leon Avenue. On display were pieces of correspondence from neighborhood residents opposing highway development as well as handbills promoting protest events in neighborhood parks. This section of the exhibit included a re-creation of a large anti-freeway sign created by the organization CAUTION (Coalition Against Unnecessary Thoroughfares In Our Neighborhood), another neighborhood opposition group. The sign was an exact

replica in terms of size and color (bright orange) and allowed exhibit visitors to grasp the intensity of anti-freeway opposition.

There was also an interactive table explaining the archival process and displaying archival tools, such as acid-free boxes, micro-spatulas, and plastic clips. Displayed here were the finding aids for the four collections featured in the exhibit, which gave visitors a sense of the extent of the collections and the diversity of materials contained within them. We found that having both archivists and historians working on the exhibit was of substantial benefit. The archivists focused on promoting holdings and explaining the purpose of archives and the daily work that goes on in them, and the historians were equipped to place the individual documents and narratives into broader historical trajectories, as well as create the Atlanta timeline. The result was an exhibit that informed the public both about the process of archiving as well as how archival holdings can illuminate the broader narratives of the past.

» **In order to promote the exhibit to the larger Atlanta community, the curators participated in a panel discussion at Emory University in April 2016, discussing the exhibit planning and putting its content into broader historical context. We initially planned to have a separate event for each of the four sections, but quickly realized that trying to execute four events in quick succession would be overwhelming, and decided to have one large event instead.**

#### OUTREACH

In addition to the interactive materials available in each section of the exhibit, there were other opportunities for visitors to interact with the exhibit. Attendees could leave post-it notes on two facing walls commenting on changes that they themselves had witnessed during their time in the city; several visitors commented on increased traffic and other transportation problems, but others spoke positively about the city's cultural life and its recommitment to redeveloping neighborhoods and green space near downtown Atlanta. Attendees could also take home a series of commemorative postcards to provide a lasting connection to the archive, each of which featured images from the collections on display. Like many exhibits, there was also a guestbook for visitors to leave comments. One said that, "as a new resident of the Atlanta area, I truly enjoyed learning about the city's history." A resident of Druid Hills said, "thanks for including the neighborhood" in the exhibit. The exhibit also seemed to inspire one student to think critically and productively about the city, as she noted that "you can't stop change, but you can decide what kind of change it will be."

Several undergraduate students left their email addresses in the guestbook and asked for further information on employment or internship opportunities at the Rose Library, providing clear evidence that the exhibit had had a positive effect on their engagement with archives. Outreach strategies were not specifically targeted at undergraduate students, but because the exhibit was installed in a section of the library that receives voluminous foot traffic, many undergraduates had the chance to stop and view it. Unfortunately, a course on African American history in Atlanta was offered in the Department of History in fall 2015, and it ended before the exhibit

opened, but there will certainly be future opportunities to link exhibits on local history with courses on local history, such as encouraging instructors to have the class visit the exhibit—perhaps with a guided tour—as part of a class section, or having students complete an assignment outside of class time that requires them to view the exhibit. From my own experience teaching undergraduate history courses, I have found students have often thought very little about where the narratives in their textbooks come from, and analyzing primary documents helps illuminate this process. Exhibits are an excellent way to undertake this activity in greater detail and depth. Students who have recently moved to the area to attend college have often never thought about the histories that shaped the current environment in which they find themselves, and this exhibit gave them the chance to do so.

In order to promote the exhibit to the larger Atlanta community, the curators participated in a panel discussion at Emory University in April 2016, discussing the exhibit planning and putting its content into broader historical context. We initially planned to have a separate event for each of the four sections, but quickly realized that trying to execute four events in quick succession would be overwhelming, and decided to have one large event instead. The event was held in a room directly adjacent to the exhibit display, and approximately 100 people attended, many of whom had been invited. We worked with the library's development staff, which compiled a list of invitees, to plan and execute the event. There was also news coverage in local cultural affairs publications, such as Atlanta's Creative Loafing magazine, that attracted attendees, and we sent out an email invitation to graduate students in the Department of History. The chair of the

Department of History, also the dissertation advisor for two of the history graduate students curating the exhibit, introduced the panel. Moderating the panel discussion was a recent Emory History Department doctoral graduate who had written his dissertation on Atlanta's metropolitanization from 1950–2000.

Event attendees included longtime Atlanta residents who had participated in some of the history highlighted in the exhibit, including the CCAA's activism and the fight against the Stone Mountain Freeway. The discussion highlighted some additional historical information on Randolph Thrower and the Community Council of the Atlanta Area, and an evaluation of how the activities of the Sibley Commission fit into the longer trajectory of racial change in Atlanta. After the discussion, the curators spoke with attendees in the exhibit gallery itself as they browsed the displays. Randolph Thrower's son attended by invitation and was pleased to see that his father's campaign song from a half century before had been recorded and brought back to life. Residents of the Druid Hills neighborhood were especially excited to see the section of the exhibit on their community, and several said that they hoped that their materials might end up in a similar exhibit someday. About a month later, the curators also presented material on exhibit planning and content to a scholarly audience at the Atlanta Studies Symposium at Georgia State University.

At a separate event held at the Rose Library immediately before the public panel, the curators spoke to invited Druid Hills residents and members of the Georgia state legislature about the value of historical material and the importance of archival preservation. Given my own subject matter expertise in American environmental history, I highlighted the fact that the DHCA records contain documents related to the

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legal settlement that stopped freeway incursion into the neighborhood. The settlement turned on the accuracy of the Georgia Department of Transportation's production of an environmental impact statement, a necessary step in government construction projects that had been mandated by the National Environmental Policy Act in 1969. The DHCA's activism in contesting the environmental impact statement, I explained, represents an important case study for environmental historians assessing the impact of environmental legislation in the 20th century. That was only one small example pulled from the 60 linear feet of the DHCA records, I explained, and there were many dozens of other connections to broader historical narratives that I saw while processing the collection. I encouraged the audience to think about what valuable historical materials might be in their attics or basements, in need of a safer permanent environment. Many of the attendees did not know about the opportunities to place their papers with local archives, and the curator of the Rose Library's Atlanta collections was present to provide more information, hand out business cards, and establish contacts. Several attendees indeed expressed their interest in placing their own personal papers with the Rose Library. Because one of the major issues in dealing with potential donors is building trust, being able to show them a professional production created with related records assured them that their materials would be treated with care and respect.

One issue we encountered was that potential donors insisted that we, the exhibit curators, be the ones to handle the processing of their papers should they be donated. Because two of us were graduate students in the Department of History and would not be at the institution permanently, we could not make that promise. Staff should

be prepared to assure potential donors that all archivists will handle their materials competently and respectfully, and should be prepared to have potential donors meet with permanent staff at a later date as a follow-up.

We also found that exhibit visitors sometimes had very strong opinions about some of our interpretations of the events in question, especially those in which they had personally participated. For example, we tried to present the controversies over freeway development from a neutral point of view, having sympathy both for the state's attempts to ease traffic flow and locals' desire to protect their neighborhoods from destruction. Some Druid Hills residents, however, insisted on seeing their position as the only reasonable one, and referred to the Georgia Department of Transportation with words such as "evil." We were able to use this potential point of conflict as an opportunity to encourage Druid Hills residents to donate their records to the repository in order to have their side of the story told as comprehensively as possible by future scholars.

#### CONCLUSION

Taken together, the exhibit and related events were a successful outreach initiative to the local community. Exhibit attendees learned about what archives are and how they operate, and event attendees learned about the content of the Rose Library's collections. As we found, attendees were excited to learn about the "hidden histories" embedded within the areas where they lived and worked. Since many archives collect materials related to local history, similar exhibits and events could be done at a wide range of other repositories, based on collection holdings. Every city and community has its own history, and local archives often hold the papers and records of individuals and

groups who participated in that broader narrative. The opportunities for future exhibits are vast. ■

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# When a Repository Is Not Enough

» Redesigning a Digital Ecosystem to Serve Scholarly Communication

BY ROBIN R. SEWELL, SARAH POTVIN, PAULINE MELGOZA, JAMES SILAS CREEL, JEREMY T. HUFF, GREGORY T. BAILEY, JOHN BONDURANT, SEAN BUCKNER, ANTON R. DUPLESSISL, LISA FURUBOTTEN, JULIE A. MOSBO BALLESTRO, IAN W. MUISE, AND BRIAN J. WRIGHT

## INTRODUCTION

Over the past decade, under the banners of scholarly communication, special collections, collection development, and digital scholarship, academic libraries have taken on greater responsibilities for collecting, publishing, and preserving a range of digital assets. These include the creative and scholarly output of libraries' host institutions, digitized or born-digital general collections holdings, and a diverse array of materials from special collections and archives.

Broadly, "digital asset management consists of management tasks and decisions surrounding the ingestion, annotation, cataloguing, storage, retrieval, and distribution" of image, multimedia, and text files (Wikipedia, 2017). These tasks rely on digital asset management systems (DAMS) that are either commercial products, open-source systems (out-of-the-box or customized), or entirely homegrown to meet diverse needs. DAMS differ in their approach to functions and offer a range of associated capabilities.

The infrastructure for managing an academic library's digital assets might include DAMS oriented toward scholarly publication needs, deployed in the form of institutional or data repositories, or archival and special collections needs with modules aimed at display and exhibition. Base infrastructure requirements for scholarly publication have expanded as libraries' scholarly communication programs have extended to inculcate openness across the entire research life cycle, encompassing or allying with digital scholarship and digital humanities, data curation and management, library publish-

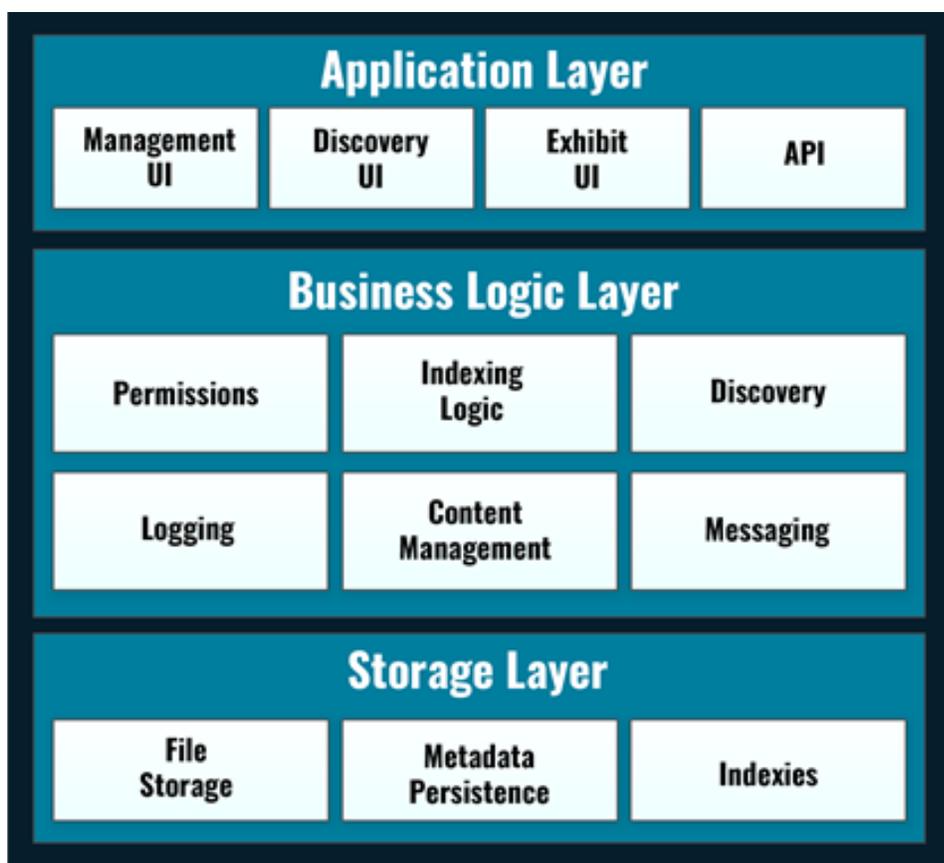


Figure 1. Generic DAMS implementation

ing, and evaluation metrics.

At our institution, an increased range of scholarly communication and digital scholarship publishing services had been shoehorned into an institutional repository infrastructure: the libraries' existing DAMS, DSpace, had been in use since 2004 (Maslov, Mikeal, & Leggett, 2009). "Scholarly communication" in the library had been broadly construed to include much of the library's digital collection development and management, with an emphasis on open access. Although the libraries had a long-standing commitment to the open source DSpace community, and while recent upgrades had further enhanced the capabilities of DSpace, its flat metadata structure and prescrip-

tive data modeling made representation of complex objects difficult to achieve. Outside tools, such as book readers, were incorporated to fulfill the libraries' display and online exhibit needs. Efforts over the years to integrate these tools into the DSpace interface had become unsustainable, with these integrated components requiring extensive mending and rebuilding with every DSpace upgrade. Increased interest in storage and display of streaming video content, geographic information system (GIS) data, and 3D specimens could not be accommodated by the DSpace version then in use (DSpace 4.0).<sup>1</sup> In short, a tool designed for sharing preprints was not ultimately well suited for managing preservation workflows and

» **The Digital Asset Management Task Force (TF) was created in August 2014 and charged with investigating and making recommendations for a solution or solutions that would enable the libraries to store, display, and preserve new forms of university information and research, including digital scholarship, special collections, and archives.**

complex digital library holdings.

Simultaneous to our local realization, an international community effort to forge a collective “DSpace Vision” for the platform emphasized the need to “focus on the fundamentals of the modern ‘Institutional Repository’ use case.” This community-supported vision pledged that DSpace “will be designed in such a way that it can be easily/quickly configured to integrate with new and future tools/services in the larger digital scholarship ‘ecosystem’” (Donohue, 2014, DSpace 3-5 Year Vision Statement).

In our library, these twin promises—of a closer emphasis on institutional repository functionality (rather than broad digital library or asset management design) and the potential to integrate with other systems—positioned DSpace as a likely component among other tools fulfilling our diverse digital needs. These factors, coupled with strategic hiring that forged a cross-unit emphasis on digital collection-building and preservation, prompted a reevaluation of our strategy of using DSpace for any and all university-generated open access content. We needed to look for a more robust, complementary DAMS to meet the existing and projected needs of the university.

The Digital Asset Management Task Force (TF) was created in August 2014 and charged with investigating and making recommendations for a solution or solutions that would enable the libraries to store, display, and preserve new forms of university information and research, including digital scholarship, special collections, and archives. The TF was instructed to evaluate DAMS products and identify an optimal solution. Our scope was limited to evaluating the suitability of existing commercial and open-source DAMS—evaluation of exhibit layer software and development of workflows and policies would be undertaken by separate task forces. Perhaps unusual in the charge was the instruction that our recommendation should attempt to report but not weigh cost. Members of the

TF were drawn from all areas of the library, including user services, special collections, cataloging, digital initiatives (the libraries’ IT group), medical libraries, preservation, and scholarly communication. There were special challenges associated with reviewing open source software and with comparing commercial and open source DAMS costs and capabilities. As Woods and Guliani (2005) argue, open source software is difficult to evaluate. Commercial software vendors invest in marketing and communicating functionality and benefits in ways that open source communities do not; open source tools must be assessed through installation and testing. While commercial solutions may come with a specific price tag, open source costs are more elusive and tied to local IT staffing. Woods and Guliani (2005) observe,

*With an open source program it is far more likely that an IT department will have to solve an integration or customization problem on its own. It’s hard to generalize about whether this is a strength or a weakness of open source. . . .*

*Anything can be done with open source, so the barrier to creating the optimal system for supporting a business process is often lower. (pp. 73-74).*

This article presents two models: (1) a process for identifying, selecting, and evaluating open-source and commercial DAMS; and (2) a “digital asset management ecosystem” (DAME) approach to technical infrastructure that comprises a distributed, linked set of open source platforms.

#### LITERATURE REVIEW

The TF scoured DAMS articles and case studies from academic institutions to (1) generate an exhaustive list of current commercial and open source system digital asset systems and analyze and adapt DAMS needs assessment and selection processes. This environmental scan provided the basis

of our assessment methodology.

Finding the elusive perfect DAMS fit requires both an analysis of institutional need—pertaining to content and collections, users, and administration—and available tools. Some reports bundled these analyses; others were oriented toward either needs or tools. The practical literature revolves around two main scenarios: institutions starting from scratch and those that have outgrown their current DAMS and are looking to migrate to a new system or systems with increased functionality. The University of Utah’s exceptional report and webinar document their robust review process, criteria, and a DAMS scoring model, ultimately recommending a migration from CONTENTdm to Hydra (Masood & Neatrou, 2014). We adapted their model for our own testing. Stein and Thompson (2015) provide a metareview of DAMS migration studies in their analysis of motivations, observing a tendency of institutions to move from proprietary to open source systems (“primarily Islandora, Hydra/Fedora, and DSpace”) (section 4.2, para. 3). Michigan State’s analysis unfolds in an environment without a “comprehensive, campus-wide digital preservation strategy” or institutional repository (Schmidt, Ghering, & Nicholson, 2011, p. 106). Their “digital curation planning project to explore and evaluate existing digital content and curation practices” (p. 110) issued in the early stages of identifying digital content and developing policies and procedures, and focused as it was on assessment, included a detailed survey that was sent out to their campus. The National Library of Medicine’s report evaluates 10 commercial systems and open source software programs (NLM Digital Repository Evaluation Selection Working Group, 2008). Of particular interest to us was the in-depth test of the final three systems and NLM’s selection of Fedora on the basis of its flexibility, active development community, and open source code. A

# Table 1. DAMS considered for evaluation

DAMS	License	Developed by	Website
ArchivalWare <sup>a</sup>	Proprietary	PTFS	<a href="http://www.archivalware.net">http://www.archivalware.net</a>
CONTENTdm <sup>a,b</sup>	Proprietary	OCLC	<a href="http://www.contentdm.org">http://www.contentdm.org</a>
Cumulus	Proprietary	Canto	<a href="https://www.canto.com/cumulus/">https://www.canto.com/cumulus/</a>
DAITSS <sup>a</sup>	Open Source	FCLA	<a href="http://daitss.fcla.edu">http://daitss.fcla.edu</a>
DigiTool <sup>a,b</sup>	Proprietary	ExLibris	<a href="http://www.exlibrisgroup.com/category/DigiToolOverview">http://www.exlibrisgroup.com/category/DigiToolOverview</a>
DSpace 5 <sup>a,b</sup>	Open Source	DuraSpace	<a href="http://www.dspace.org">http://www.dspace.org</a>
Eprints <sup>a</sup>	Open Source	U. of Southampton	<a href="http://www.eprints.org/uk/">http://www.eprints.org/uk/</a>
Fedora <sup>a,b</sup>	Open Source	DuraSpace	<a href="http://www.fedora-commons.org">http://www.fedora-commons.org</a>
Greenstone	Open Source	New Zealand Digital Library Project	<a href="http://www.greenstone.org">http://www.greenstone.org</a>
Hydrab	Open Source	DuraSpace	<a href="http://projecthydra.org">http://projecthydra.org</a>
Invenio	Open Source	Invenio Software (CERN)	<a href="http://invenio-software.org">http://invenio-software.org</a>
Islandora <sup>a</sup>	Open Source	DuraSpace	<a href="http://islandora.ca">http://islandora.ca</a>
Keystone DLSc	Open Source	Index Data	<a href="http://www.indexdata.com">http://www.indexdata.com</a>
KORA	Open Source	Michigan State Univ.	<a href="http://kora.matrix.msu.edu">http://kora.matrix.msu.edu</a>
Luna	Proprietary	Luna Imaging	<a href="http://www.lunaimaging.com/software">http://www.lunaimaging.com/software</a>
MDIDD	Open Source	James Madison Univ.	<a href="https://mdid.cit.jmu.edu">https://mdid.cit.jmu.edu</a>
Mnesys <sup>b</sup>	Proprietary	Naoned Systemes	<a href="http://www.mnesys.fr">http://www.mnesys.fr</a>
Nuxeo	Hybrid	Nuxeo	<a href="http://www.nuxeo.com">http://www.nuxeo.com</a>
Omekab	Open Source (exhibit only)	George Mason Univ.	<a href="http://omeka.org">http://omeka.org</a>
ORIOA <sup>b</sup>	Open Source	National Consortium	<a href="http://www.ori-oai.org">http://www.ori-oai.org</a>
ResourceSpace	Hybrid	ResourceSpace	<a href="http://www.resourcespace.org">www.resourcespace.org</a>
Shared Shelf	Open Source	ARTSTOR	<a href="http://www.artstor.org/sharedshelf">http://www.artstor.org/sharedshelf</a>
TACTIC <sup>a</sup>	Hybrid	Southpaw	<a href="http://www.southpawtech.com/tactic">http://www.southpawtech.com/tactic</a>
VITAL <sup>d</sup>	Proprietary	VTLS	<a href="http://www.iii.com/products/vital">http://www.iii.com/products/vital</a>
XTF <sup>b</sup>	Open source	CDL	<a href="http://xtf.cdlib.org">http://xtf.cdlib.org</a>
Yoolib	Proprietary	Amanager	<a href="http://myyoolib.com/demo">http://myyoolib.com/demo</a>

Note: These DAMS existed at the time of testing. Some may no longer be available.

<sup>a</sup>NLM Digital Repository Evaluation Selection Working Group (2008). <sup>b</sup>Andro, Asselin, and Maison- neuve (2012). <sup>c</sup>Schmidt et al. (2011). <sup>d</sup>Masood et al. (2014).

2016 article from the University of Houston’s (UH) DAMS Implementation Task Force discusses their needs assessment, systems evaluation, and testing (Wu, Thompson, Vacek, Watkins, & Weidner, 2016); while the UH article was published subsequent to the TF’s review and recommendation, conversations with our colleagues at UH improved our approach.

Related literature offered insight into the emergent ecosystem model of digital asset management. A University of California (UC) System report details “technical and philosophical” goals for DAMS development, emphasizing modularity, principles of service-oriented architecture, and the selection of “best of breed components with open source tendencies that have broad adoption and community support” (Grapone, Fleming, Hetzner, Perry, & Tingle,

2013, p. 3, 2). In service to their goal of implementing a “progressive model for a system wide DAMS,” the UC System selected Nuxeo, an open source product with vendor support, as an immediate, interim solution (p. 2). A recent article on UH’s implementation delves further into their workflows and DAMS architecture — “an ecosystem of modular components” — deployed and developed to support access and preservation of the libraries’ digitized cultural heritage holdings (Weidner et al., 2017, Bayou City DAMS Ecosystem, para. 1).

Given the rapid changes in digital asset management design and approaches, and the nature of the systems dominant in cultural heritage institutions (whether open source or commercial, these solutions engender robust communities of practice), published reports and articles

represent a small fraction of what might be described as relevant scholarly analysis and frameworks. These reports and articles are foundational, situate our work in a larger context, and provide adaptable models of assessment. But in constructing a fuller understanding of assessment approaches and system options, the TF additionally benefitted from myriad conference presentations, hallway conversations, shared internal documentation, and phone calls with colleagues at other institutions invested in digital asset management needs and systems assessment.

## DESCRIPTION OF PROCESS

The task force installed products and evaluated their capabilities against a task-based rubric of essential features, gleaned from internal library and university needs assess-

ments, using representative test collections. Here, we include lessons learned that will help libraries undertake similar evaluation processes to serve scholarly communication and digital service needs. We also discuss obstacles encountered in our attempt to test complex systems that may not have all necessary features available in their vanilla, out-of-the-box implementation. Both our findings, detailed in data supplementary to this article, and relevant assessment tools have been deposited in the Texas Data Repository.

## PRELIMINARY WORK

### **Needs Assessment**

Criteria for the DAMS and the selection of testing document types were informed by two needs assessments. The first was an internal library needs assessment conducted by the libraries' scholarly communication unit in 2013 through informal meetings with each library unit or department to assess current interest and potential projects. The second, more formal needs assessment was a campus-wide survey initiated in response to interest expressed by other university units in the creation of a campus-wide asset management solution (IRB 2017-0744). Several units on campus had either brought up a DAMS or were looking into bringing one up to manage their locally created digital assets. Business cases—such as managing university marketing departments' assets—were included alongside university-wide scholarly communication and research needs. Campus entities voiced an interest in a campus-wide system, designed and hosted by the library, which would serve everyone's needs. The TF charge was adjusted to meet the broader scope, and members were added from outside the libraries. A survey was created and sent to representatives at the various campus units to gauge interest and gather data on current and future needs, including space, files types, preservation requirements, and access restrictions.<sup>2</sup>

### **Identification and Review of Available DAMS**

The TF began by conducting literature reviews and environmental scans, as discussed above in the literature review, to investigate current digital asset systems and review DAMS need/selection assessment processes at a number of peer institutions. Consultations with and documentation provided by the University of Utah, University of Houston, and Penn State University

were particularly helpful, as were reports out of Michigan State University, the University of California, and the National Institutes of Health. Based on this research, the TF was able to scope beyond the commercial and open-source systems most familiar to libraries, generating a list of 25 possible systems (Table 1). Members of the TF reviewed each of these systems in depth to identify the license type (open source, proprietary, or hybrid), the organizations responsible for development and management, the institutions that used the systems, the presence or absence of an active development community, and additional anecdotal information from articles, case studies, or conversations with users of the systems. DAMS were eliminated from consideration based on lack of community support, lack of active development, or absence of an English-language interface or a North American user community (see Table 1).

Members of the libraries' IT unit further evaluated 17 of the most promising DAMS against a matrix of features to determine if the DAMS would be compatible with other programs, programming languages, and software used throughout the libraries (e.g., Java-based) and were likely to be successfully integrated into a networked digital asset ecosystem model. IT evaluated each system using a six-point Likert scale (0 least, 5 most) on existing institutional knowledge, application programming interface (API), discovery (ability to search within the DAMS), documentation, community health (size and activity of support community), and development health (ongoing development and new versions). The IT matrix is available in the supplemental data.

### **SELECTED DAMS**

Based on the TF evaluation results and the IT matrix scores, the TF selected four systems for testing. Two systems—Islandora and Hydra with Sufia and Blacklight (Hydra/Sufia)—were open source, and two were hybrid commercial and open source options—ResourceSpace and Nuxeo. DSpace, the libraries' current DAMS, was added to the test group as a delta, the minimum standard of functionality. In order to serve as a minimum standard and not be given an unfair advantage, DSpace 5.5 was also tested as an out-of-the-box deployment without any of the enhancements and customizations found in the libraries' DSpace 4 instance.

Our nascent digital ecosystem approach, described in greater detail later in this

article, opened up the possibility of modular development and supplementing DSpace with additional tools and services that, deployed in the distributed service architecture, might bridge functionality gaps and extend DSpace's capabilities. Every system selected boasted a robust API, broad adoption, strong community support, and the ability to function as either a modular component in a DAME or a standalone DAMS (including a range of functionality and support for user management, display, indexing and discovery, built in statistics, etc.).

## EVALUATION PROCESS

The TF decided to pilot each system individually and sequentially with a common rubric using multiple predetermined sets of sample content containing various types of files based on use cases gathered from the campus needs assessment survey as well as library-based needs. The test bed included simple files, metadata files, complex related objects, and AV content.

### **Initial Rubric & Scoring**

The initial rubric (long rubric or LR) consisted of over 200 tasks of varying complexity. The rubric tasks or functions were grouped into the following eight sections: Inputting and Structuring Content, User Management, Ticket/Request/Workflow, Statistics and Reporting, Discovery, Relational Linking, Presentation, and External Systems.

The TF recognized that in most cases, the Relational Linking and External Systems categories would require research to determine feasibility of implementation rather than actual testing; however, these categories contained important components for existing and future scholarly communication needs—including Archivematica, Shibboleth, ORCID, VIVO, and Plum Analytics integrations in our larger scholarly communication ecosystem—and warranted investigation and scoring.

Each TF member was assigned multiple subsections of the rubric to test across all systems using the defined test collections. Task assignments were based on TF member experience and expertise, and each task was tested by two or three TF members. Members were instructed to limit testing and evaluation to 20 minutes per task and grade each task on ease of completion using a scale of 0 (low score, not possible) to 3 (high score, easily completed). If a task could not be completed using our implementation, additional investigation was

**Table 2. Summary of Long Rubric and Short Rubric scores**

DAMS	Long Rubric (717 points)		Short Rubric (48 points)	
	Total Points	Percentage	Total Points	Percentage
DSpace	321	44.77	27	56.25
Islandora	263	36.68	28	58.33
Hydra/Sufia	306	42.68	18	37.50
Nuxeo	—	—	43	89.58
ResourceSpace	—	—	32	66.67

conducted using DAMS documentation and other sources to determine if the task was feasible with additional configuration or development. A score of “C” was used to denote that the task was possible with configuration or local or community development, and a “T” (time out) denoted that a solution was not found within the allotted 20 minutes. Notes were gathered in the spreadsheet to help members testing the same task communicate with each other and keep track of research to help determine if a task could be configured.

**Deployment**

The systems were developed, deployed, and tested, generally in one-month intervals, in the following order: DSpace, Islandora, Hydra/Sufia, Nuxeo, and ResourceSpace. For the first three pilots, library IT developed a sandbox/test environment for TF members, providing them with accounts/logins and technical support, when necessary. However, because of technical problems with our local deployment of Islandora, many tests were performed on a sandbox hosted by Islandora3 rather than our local test instance. TF members completed all assigned sets of tasks using the rubric and the predetermined sets of sample content.

**Obstacles**

The TF encountered two obstacles after testing was completed on DSpace, Islandora, and Hydra/Sufia. The TF was under pressure to wrap up testing as it neared the end of its second year. This deadline limited the ability of the TF to deploy the open source versions of Nuxeo and ResourceSpace. In addition, during a conference call with the UC Digital Library (UCDL) group, the TF learned that key components of Nuxeo’s functionality were available only through the vendor’s subscription service, and not included in the open source version. UCDL also discussed the potential for steep escalation in annual fees associated with the vendor-based solution. Although the TF

was charged with evaluating DAMS without considering cost, this news raised concerns for Nuxeo’s viability as a DAMS candidate.

Because Nuxeo could only be evaluated through a demonstration by the vendor, and because of time constraints, the TF created a short rubric (SR) to assess Nuxeo and the remaining DAMS for testing, ResourceSpace. The SR consisted of 24 criteria with a possible score of yes, no, or partial. A partial score was used to indicate that the feature was not currently implemented, but could be implemented without too much difficulty, or was currently available but lacking in some desired components.

**Reconciling Rubrics**

Having three systems graded using the granular, task-based LR and two evaluated using the criteria/feature-based SR made comparisons between the systems problematic. After exploring the possibility of mapping scores between the long and short rubrics, the task force ultimately rescored DSpace, Islandora, and Hydra/Sufia using the SR, to provide a consistent method of comparison with Nuxeo and ResourceSpace. The LR remained useful for comparing DSpace, Islandora, and Hydra/Sufia.

**EVALUATION SUMMARY AND RECOMMENDATIONS**

**Rubric Scores**

The LR and SR rubric scores were converted to numeric values to facilitate comparisons of the DAMS. Each LR task had a maximum value of 3 points. Assigned numeric scores were taken at value, each C score had a value of 1, and each T score a value of 0. The final LR task score was the average of the individual member scores. SR yes, no, and partial feature scores were assigned point values (yes = 2 points, partial = 1 point, no = 0 points). **Table 2** shows the summary scores for both the LR and SR (detailed results are available in the supplemental data).

That none of the DAMS evaluated using

the LR achieved 50% of the total possible points may be an indication that our LR rubric was overly ambitious or that the DAMS were resistant to out-of-the-box testing. The SR scores for the two commercial products, Nuxeo and ResourceSpace, were much higher than the SR scores for the three open source DAMS (DSpace, Islandora, and Hydra/Sufia). The differences in scores could indicate the presence of capabilities that are more fully developed in the commercial applications, but must be configured or developed in open source systems. While Nuxeo is the clear winner based on the SR evaluation, the cost made it a less attractive solution.

**Qualitative Impressions**

Our evaluation allowed us to quantify and visualize each DAMS’ ability to provide needed functionality and to potentially complement the libraries’ existing DSpace instance with an eye toward the implementation of a DAME and the ability to expand to meet growing campus-wide scholarly communication needs. At the end of the evaluation process, the TF members provided their overall impressions of the DAMS gather during testing.

**Islandora**

The TF had mixed results and feelings about Islandora, including its reliance on Drupal as an interface and the inability to authenticate and set granular permissions. It also did not score as well as Hydra/Sufia on the LR, and had a higher number of configuration and time-out scores than either DSpace or Hydra/Sufia.

**Hydra/Sufia**

While Hydra/Sufia is backed by a large and engaged community and had an intuitive and well-designed user interface, the tested version of Sufi—Sufia 6—also lacked metadata versioning and the ability to authenticate and set granular permissions.

**Nuxeo**

Nuxeo scored well on the SR, had many of the desired features, and would have enabled rapid deployment of a DAMS; however, these positive aspects were outweighed by the ongoing and potentially increasing cost of the vendor model that includes Nuxeo Studio.

**ResourceSpace**

ResourceSpace was of interest because it

was in use by some campus groups and would have facilitated content sharing. Unfortunately, ResourceSpace did not support structured meta- data, which is an essential feature in a DAME component to supplement DSpace.

#### **Fedora 4**

At the end of the review process, TF members found that they appreciated the functionality provided by Fedora, which underlies both Islandora and Hydra/Sufia. While it is not a full freestanding DAMS, it provided access to many desired features, including support for complex and hierarchical metadata, linked data capabilities, and the ability to function well as a component of the DAME. Fedora's strengths include the following:

- Has a robust development community, under the umbrella of DuraSpace (with some possibility of integration with VIVO and DSpace)
- Forms the basis of several popular open-source DAMS, including Hydra and Islandora
- Is a flexible object model that is complementary to DSpace's more constrained model
- Implements the Linked Data Platform W3C recommendation with support for RDF expression
- Has built-in durability functionality
- Implementation draws on local strengths with Java development

Fedora's weaknesses include the following:

- Requires a significant investment of developer time and support, potentially in addition to the contracting of support teams like the Data Curation Experts group<sup>4</sup>
- Requires community investment to gain fluency (including attending Fedora users group meetings and Fedora Camps)

The TF identified several ways to extend DSpace functionality that would allow it to serve as an interim solution while Fedora 4 and the DAME are implemented. Video capability of our current DSpace could be extended by installing new video streaming tools developed at Virginia Tech. The need for completely private deposits, not visible to anyone, would be handled by the use of private status in DSpace, depositing those items directly in Archivematica, or bringing up another instance of DSpace for dark storage.

#### **LESSONS LEARNED**

In our search for a DAMS that was just right, we faced challenges in designing testing protocols and encountered technical options with complex, multifaceted implications. Our extensive research and testing also positioned us to discover system functionalities outside of our initial set of use cases and needs.

#### **EVALUATION CHALLENGES**

A core goal was the generation of data on DAMS under consideration as the basis for an evidence-driven decision. We knew from experience that advertised features—even in community-supported open source systems—didn't always function as promised. The TF developed a set of requirements formed around a community needs assessment, designed an extensive task-based testing protocol with multiple testers (as the basis for establishing and accounting for reliability), and supplemented task-based testing with research-based testing and unstructured interviews with current users of the systems under consideration. But the DAMS themselves, each of which included constantly evolving features, complicated this robust protocol. By deploying out-of-the-box versions of DAMS, we may have been inadequately attentive to features that had not yet been folded into core code. Additionally, despite our investment in testing, the TF was aware that task- and research-based inquiries were potentially inadequate substitutes for community embeddedness: in short, owing to incomplete documentation and distributed user networks for these products, it was impossible to get a full picture of capabilities simply through research and testing. Our selection of Fedora and preferencing of an ecosystem model (described below) served, to some extent, to compensate for the barriers to a total evaluation of current and potential functionality: by emphasizing components over an all-in-one system, we have broken down some of the potential complexity of the latter in favor of more easily evaluated and certainly more closely scoped elements.

#### **DEPLOYMENT TRADE-OFFS**

During our review and testing, the TF observed a trade-off between ease of deployment and flexibility. While all-in-one, out-of-the-box systems enable rapid deployment and minimal investment in IT personnel time, their ease of use is accompanied by inflexible data models and approaches that

limit their functionality and make them cumbersome to use. Conversely, the systems with the greatest flexibility and range of functionality require considerable IT time to deploy and near-constant maintenance. Additionally, we observed the potential necessity of configurations that curtail the flexibility of DAMS in order to frame a more usable, interoperable platform: for example, highly flexible Fedora implementations often employ relatively prescribed data modeling or rigid administrative interfaces that limit range of use. This observation affirms the design principle of a "Flexibility-Usability Trade-off," which dictates that "flexibility has real costs in terms of complexity, usability, time, and money" (Lidwell, Holden, Butler, & Elam, 2010, p. 102).

#### **Task Force Size and Composition**

The TF was a large committee with representatives from across the libraries and two individuals from university units. While it is essential to have feedback from the represented units, a smaller, more focused group that interacted periodically with library units and interested outside parties would have been more agile than the large committee. The LR evaluation process was time intensive, and having a task force composed of individuals with dedicated time set aside for the evaluation rather than having TF duties added to already busy schedules and heavy workloads would have helped move the evaluation process forward more rapidly. The inclusion and active participation of a member of the libraries' IT team was crucial to the evaluation process and provided needed insight into the potential of a DAME and the possibility of integrating DAMS with other library software systems. However, this may have introduced some bias or path dependency, as existing IT strengths and skills sets were considered in the DAMS selection process.

#### **Rubrics**

Testing with two different rubrics was not an ideal situation. The LR provided a lot of information, but may have been overly complex. It was time consuming to test and score each DAMS. The detailed testing and configuration notations used in the LR turned out to not be as helpful when the information was consolidated to create a final score. The LR did reveal issues that would not have been discovered with SR—issues with metadata handling, versioning, and multipart objects. However, the changing

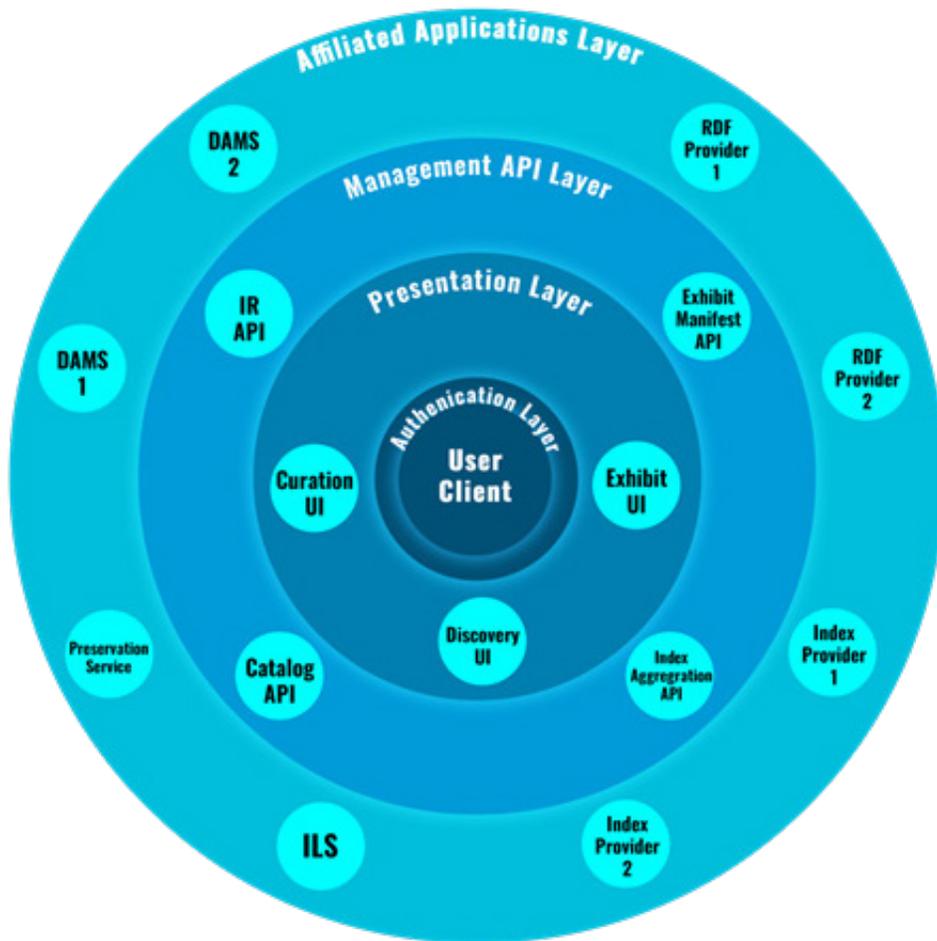


Figure 2: Vision for DAMS service integration

nature of the open source systems tested made complete functional deployment of out-of-the-box systems challenging. For example, complications with Islandora’s deployment led to testing on the existing Islandora sandbox rather than our own implementation, and local knowledge of DSpace informed us that out-of-the-box required adding SWORD to enable file upload functionality.<sup>5</sup>

The SR criteria meant that DAMS did not need to be fully deployed to be evaluated. Given the resistance of the DAMS to local testing, it was, in some ways, a better fit to have a short impressionistic rubric rather than a long, task-oriented one. It would also be useful in a situation where it was not feasible to deploy a DAMS for detailed testing, like the TF encountered with Nuxeo, or in a setting with insufficient IT capabilities to bring up and test a DAMS. However, testing with the SR alone would not have revealed the strengths of Fedora underlying two of the open source systems (Islandora and Hydra/Sufia), and the opportunity to explore Fedora as a DAME component would have been missed.

### A DIGITAL “ECOSYSTEM” TO SERVE THE SCHOLARLY COMMUNICATION ECOLOGY

As we evaluated the variety of candidate DAMS, it became apparent that no single system could meet the diversity of library and campus needs by itself. The technician on the committee proposed that we consider solutions involving an ecosystem of many services that could communicate while separating concerns among storage, preservation, and access needs. This realization suggested a new designation for the architecture: the Digital Asset Management Ecosystem (DAME).

Having settled on a DAME as the most appealing solution, the evaluation was refocused on interoperability and complementary functionality of components of the scholarly communication ecology. In this view, a given DAMS plays a central role of storing items and metadata and providing interfaces to enable access and administration.

The technical documentation of various DAMS presents a variety of architectural diagrams, but they all share certain core architectural layers and features. For the purposes of exposition, we can call these the

“Application,” “Business Logic,” and “Storage” layers. The Application layer of a DAMS provides user interfaces for management, discovery, and exhibition. It also exposes APIs for use by third-party applications. The Business Logic layer mediates access from the Application layer to the Storage layer where content and metadata are hosted. The Business Logic layer handles such roles as event logging, event messaging, indexing of content, and access permissions. The Storage layer is the ultimate repository of content (files) and metadata. It typically manifests as a file system and database, but variations and adjuncts such as Solr indexes, RDF triplestores, and cloud storage are possible. A generic representation of such an application can be seen in **Figure 1**.

A DAME will exhibit a layered architecture like a DAMS, but the DAME differs in that its component parts are discrete applications and services. These applications and services are distributed across the layers of the DAME. Its various components (including DAMS) all participate with the DAME in a modular fashion. In general, a DAME will incorporate the following layers:

- Authentication
- Presentation
- Management API
- Affiliated Applications

The distribution of such applications and services across these layers is depicted in **Figure 2**.

A DAMS, which includes its own Application, Business Logic, and Storage layers will participate in the DAME as one of the Affiliated Applications. Other systems such as preservation services, an integrated library system (ILS), or scholarly tools, such as VIVO, would participate in this capacity as well. The crucial element of a DAMS or other Affiliated Application that enables participation in the DAME is the API portion of its Application layer. All major DAMS provide APIs to accommodate this role.

The Authentication layer provides a single point of entry to mediate user access to the DAME. In this way, an institution can rely on a single authentication regime (such as Shibboleth SSO) and avoid the need for users to maintain separate logins for myriad applications.

The Presentation layer houses the user-facing applications where authenticated user can manage, curate, discover, browse, and otherwise access the DAME’s content and metadata. Presentation layer applica-

tions can be custom built or off-the-shelf third-party user inter-faces. The requirement here is that they be coupled with the Management API layer, which will mediate access to affiliated services such as DAMS.

The Management API of the DAME will provide the Presentation layer with access to the underlying Affiliated Applications by communicating with their APIs. In this way, the Management API layer provides a single route of communication for the UIs in the Pre- sentation layer to interact with the various Affiliated Applications. Insofar as the DAME's Management API is coded to interact with different DAMS, the DAME can be repository agnostic; that is, if a decision is made to change out a DAMS, the rest of the DAME will not require any updates or changes. Furthermore, with a Management API in place, multiple DAMS, preservation services, ILS, or third-party APIs (for maps, weather, etc.), can be ag- gregated and homogenized for use by Presentation layer applications.

A major design consideration to help incorporate off-the-shelf third-party software in the Presentation layer and in the Affiliated Application layer is the utilization of standard pro- tocols and formats between interfaces. For example, Solr is a widely adopted indexing tool with a well-defined API—the Management API layer can provide a pass-through for Solr indexes to accommodate a wide variety of open-source discovery applications in the Pre- sentation layer. The International Image Interoperability Framework (IIIF) is another API specification that can support many important use cases when incorporated into the Man- agement API layer.

## NEXT STEPS

Our analysis of 25 systems allows us to confidently assert that no one digital asset management product will meet even a fairly standard set of library and campus needs without extensive customization. Needs will evolve and change over time, as will technological ca- pabilities, necessitating an endless quest for a better system and incurring continuing over- head in personnel time and equipment costs to discover, evaluate, deploy, and migrate new systems. The DAME model, built as it is around the addition, replacement, and removal of components, does not negate the need for ongoing investment and adjustment but rather anticipates it. Ultimately, research and scholarly communication functional- ity took prec- edent over campus business

needs. The libraries have moved forward in implementing the DAME architecture described in this article, with Fedora and DSpace serving core storage and management roles. The flexible nature of the DAME architecture, and our ambition to position services and tools for persisting complex digital objects in the context of myriad other scholarly communication services and tools, has guided the growth of an even broader digital library approach at our institution. ■

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## Footnotes

- 1 There are compelling arguments against incorporating video playback functionality in DSpace, given institutional configurations that pose technical challenges. For more on this issue, and Virginia Tech's work to implement video playback in their DSpace instance, see Gilbert and Mobley (2013).
- 2 See supplemental data, <https://doi.org/10.18738/T8/A21OLT>
- 3 <https://sandbox.islandora.ca>
- 4 <https://curationexperts.com/>
- 5 <https://wiki.duraspace.org/display/DSDOC6x/SWORDv1+Server>



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