» "Because that's what Hermione does," said Ron, shrugging. "When in doubt, go to the library."

- J.K. ROWLING

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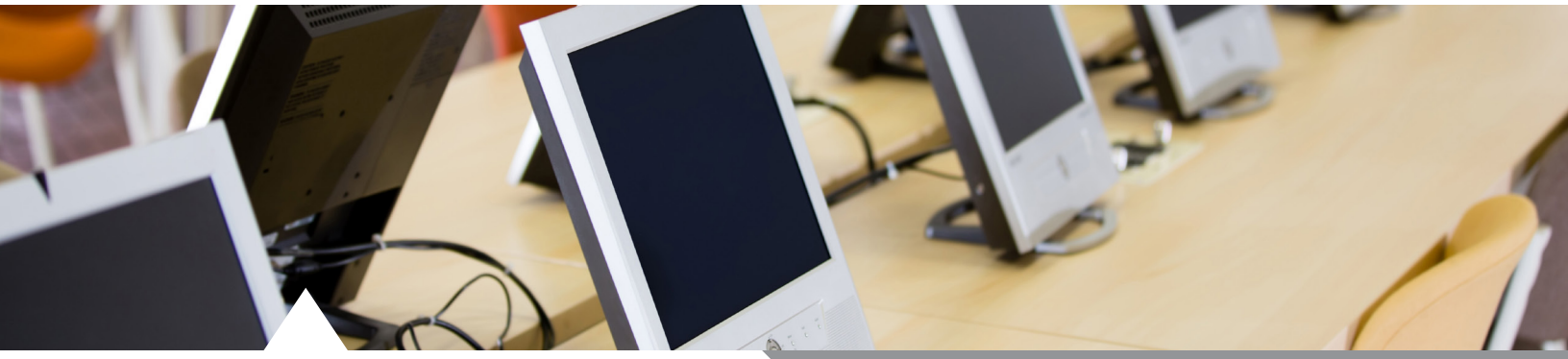

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The Holistic Academic Library: Serving the Needs of All Our Students

BY KATHLEEN STEIN-SMITH

The Library, often described as the academic center of the campus, plays a multifaceted role in supporting the research, learning, and success of its campus community.

In addition to the traditional areas of collections and services, libraries -- and librarians -- play a role that is more critical than ever in supporting research at all levels, in supporting student learning, and in promoting student, faculty, staff, and alumni success through innovative manners of engaging faculty and student interaction not only with Library collections and services, but also with the professional expertise, training, and dedication of librarians and Library staff.

These innovations are especially important today in developing a holistic Library,

photo by Jessie Ribustello.

able to respond to the needs of first-generation students, returning veterans, adult learners, students with learning disabilities, students with limited English proficiency, etc. While many of these students may have

SPECIAL COLLECTIONS EXHIBITIONS
How They Pay Dividends for Your Library

THE LIBRARY ASSESSMENT CAPABILITY MATURITY MODEL
A Means of Optimizing How Libraries Measure Effectiveness

APPLICATION LEVEL SECURITY IN A PUBLIC LIBRARY
A Case Study

photo by Jessie Ribustello.

at one time been considered non-traditional, they may be a significant presence, or even a majority, on many campuses. In addition, the campus community may extend well beyond the local campus, including distance and off-site learners, who deserve the same level of Library experience as those on campus.

While each student has always been unique, benefiting from Library services that may not only be individualized, but can also address the less tangible factors that play a role in student success, the presence of an increasing number of students who may have been considered as non-traditional for any number of reasons makes a holistic approach to Library services even more essential. Distance and off-site students may also face challenges in fully maximizing Library services and may require special outreach from the Library.

The librarians and staff are the heart of this innovative process, working together and with Library users in both traditional collaborations and settings, including individual research assistance and information and media literacy instruction, as well as in new settings online and on campus beyond the Library, and new collaborations to develop Library makerspaces, art galleries, recital programs, and in actively promoting research and research writing, as well as career research.

While none of these activities may seem unusual in themselves, the innovative change is in their development and delivery, with the non-traditional student often in need of a greater level of librarian guidance and advice, including but not limited to time, scheduling flexibility, cultural knowledge, and even foreign language skills. With a highly skilled and dedicated -- but small -- staff, a primary challenge is coverage of the public services desk and delivery of information and media literacy sessions requested by faculty for their classes.

While it might seem almost impossible to even envision addition dimensions of service, it is through sustained focus on the needs of the Library user, rather than on the types of material provided by the Library, that it becomes possible not only to improve the quality and availability of existing services, but also to consider increasing individualized services to meet a range of expressed and perceived needs that may not be fully addressed by traditional approaches.

Not only does the Library need to be holistic in its approach to providing service, the needs of the Library user -- whether a new freshman or a doctoral student, an honors student or a struggling student, a commuter versus a residential student, or a faculty or staff member working on a research project -- are a significant part of the process to provide the service needed within the holistic context of the Library user, with the Library reflectively planning, designing, and delivering service within the context of the needs and lives of students.

GIOVATTO LIBRARY AND ITS HOLISTIC APPROACH

The idea of a holistic approach to Library collections, spaces, and services is framed by the concept of holistic education and learning, which would consider the Library beyond the context of its role in supporting a particular course assignment, but rather in its role of meeting the research, learning, and study needs of a wide range of students -- some of whom may have relatively little Library experience -- both as they study and do research, but also as they interact with other Library users in a Library Cafe or Relaxation Zone, work alone or in groups in quiet, silent, and group study areas, attend a walk-in research clinic, and experience art, music, literature, poetry, and more as they interact with the collection, art on display in the Library Gallery, or attend or participate in a musical recital, etc. It could also include availability of materials from student counseling services, complimentary fruit and cookies during finals, and extended hours at midterms and finals, etc.

In addition to the above, at Giovatto Library, located on the Metropolitan Campus of Fairleigh Dickinson University, this goal has been achieved through implementation of an integrated public services model, incorporating what had been three relatively separate departments -- circulation, periodicals, and of course, reference services -- into one public services team, with the goal of providing seamless service to our Library users through collaborative teamwork, which not only provides certain efficiencies, but also allows librarians and staff who may not previously have worked together closely to collaborate, bringing together complementary perspectives on service.

The first step was the development of a single public services desk at the Library, replacing 3 separate circulation, reference, and periodical desks scattered throughout the building. Students and other Library users now know that they have one place where all their questions can be answered and where they will receive any assistance needed -- ranging from students in search of a book or article, or in need of an interLibrary loan, or of an opportunity to use the 3D printer, or one of the Library pianos, etc.

A second step was an expansion of the walk-in research clinic program, which exists in parallel to information and media literacy instruction for classes. Over a

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period of time, the walk-in clinics have expanded from selections related to specific disciplines and to core Library functions to include career research, recognizing "fake news," undergraduate research, and even a last-minute research clinic for any researcher facing a looming deadline, in response to expressed and perceived student needs.

In another initiative to bring the Library and the expertise of its librarians to students wherever they may be, librarians have collaborated with faculty in the faculty-librarian collaboration initiative, whose activities have included participation in online courses, and designation as librarian contact in course syllabi, in addition to information and media literacy instruction, individualized research assistance, etc.

Library spaces, technologies, and hours also play a role in supporting student learning and success. While it is easy to believe that students have access to both the technologies they need for research and coursework, and the study space which would empower them to succeed, this is not always the case. For all students -- but especially for adult learners, who are juggling complex schedules and demands, and for first-generation students, whose homes may not always offer a comfortable study space with an appropriate noise level, technology -- study spaces at the Library, and Library hours planned to respond to student needs may play a critical role in supporting student success.

At Giovatto Library, PCs and wireless are available throughout the building, and laptops and other devices may be checked out for use in the Library. Study spaces are clearly indicated as quiet, group, and silent, with floor plans posted for student convenience. Already offering hours 7 days a week, the Library adds extended Library hours at midterms, as well as extended Library and study hall hours during finals. During finals, the Library co-sponsors a wellness initiative, the "examtime" mini stress lab, that provides information on stress reduction and text anxiety, along with fruit and cookies, to students at the Library.

The Library sponsors Welcome Week at the beginning of each semester, with Library tours, orientation to the 3D printers, and breakfast with students. Librarians and staff participate in activities of the Wellness, Mental Health, and International Education Week committees in order to connect with the campus community beyond the Library itself.

photos by Jessie Ribustello.

Even things that are often taken for granted, like the comfort level of the temperature throughout the building, or appropriate lighting, can play a powerful role in encouraging students to spend time at the Library and to make the most of their Library time.

TRANSFORMING A LIBRARY INTO A HOLISTIC LIBRARY, OR TAKING A HOLISTIC LIBRARY TO THE NEXT LEVEL, WITHOUT BREAKING THE BUDGET

Things to consider if a Library wants to become a holistic research, study, and learning environment, or if a Library that already embraces a holistic philosophy and approach wants to become even more mindful of its own holistic nature and of the holistic nature of the student experience, include staff buy-in and engagement in the process, an understanding of theories and practice commonly used in the for-profit and nonprofit sectors, but not as widely discussed and used in libraries, and outreach to campus community stakeholders.

Among the most relevant theories are change management, social marketing, disruptive innovation, and blue ocean strategy. As defined and described by Kotter, change management is an 8-step process beginning with creating a "sense of urgency." Social marketing, as described and defined by Kotler, includes using the techniques of marketing for the greater good -- in this case, the good of our Library users. Disruptive innovation, as defined and described by Christensen, would bring new Library services intended to support the student most in need of the Library, either because they are new, underprepared, juggling an adult schedule along with college demands, re-adjusting to civilian and student life after military service, etc., transforming and sometimes replacing traditional approaches to service more likely to appeal a smaller segment of elite Library users. Blue ocean strategy, as defined and described by Kim and Mauborgne, uses the blue ocean metaphor to represent new demand and new market spaces, and opens the door to new products and services intended for the blue ocean -- in this case, students and other members of the campus community who may not have previously been Library regulars, unaware of the potential value of the collections and services of the Library in their success. A re-imagining of Library services intended to respond to the needs of underserved students would lead to the development of new, or tweaked, services in order to expand the role of the Library in the success of a greater proportion of the students on campus.

Outreach to the campus community, including but not limited to social media, the student newspaper, and library and Library staff participation in campus activities, will play an important role in communicating this pivot in service to the campus community.

In an era of budget constraints, it is especially important to remember that a re-imagining of the Library and its services from the perspective of the whole student body is not necessary costly. It is more a question of re-allocating time from some routine and traditional Library tasks that may no longer be generating the same degree of return on investment (ROI), as they had in the past. Reference librarians may need to focus more intensely on individualized assistance, or employ a broader array of teaching approaches in their information and media literacy clinics, walk-in research clinics, etc., and in the development of online resources, podcasts, etc. The traditional reader's advisory service exemplifies both

» **The key to transforming an ordinary Library into a holistic Library is the Library staff, through their buy-in, engagement, and sustainable philosophy of meeting the needs of each and every Library user -- recognizing the holistic nature of the Library as part of the student experience, and the importance of meeting the needs of the whole person/student through individualized approaches to service and instruction.**

the individualized approach to meeting the needs of the Library user and the significance of the role of the librarian as research and learning advisor, facilitator, and mentor in both course-related and independent self-directed learning. Public services staff may need to be even more proactive in reaching beyond the service desk to meet students wherever they may be in the Library and on campus in offering assistance.

FUTURE DIRECTIONS

The key to transforming an ordinary Library into a holistic Library is the Library staff, through their buy-in, engagement, and sustainable philosophy of meeting the needs of each and every Library user -- recognizing the holistic nature of the Library as part of the student experience, and the importance of meeting the needs of the whole person/student through individualized approaches to service and instruction.

Once a decision is made to embrace a holistic approach, recognizing the importance of the needs of each individual student, it is important to build buy-in and support among Library staff and Library stakeholders on campus. Beyond the Library staff, stakeholder groups can include a faculty Library committee, student advisory board, and alumni advisory board, as they do at Giovatto, which also has a regular column in the student newspaper and uses social media (FB, Twitter, and a Wordpress blog).

The most important thing is the willingness of librarians and Library staff to look at the Library and its collections and services from the perspectives of all our students, understanding that there is no such thing as a "one size fits all" approach to research, study, and learning, and a willingness to innovate Library collections, spaces, and services to serve the needs of all our students.

CONCLUSIONS

The holistic Library must not only be holistic in its approach to supporting and facilitating the research and learning process, but must also take into account the needs of students beyond those generally associated with schools and libraries, supporting the "whole student," whose life and self beyond the classroom and the campus play a significant role in the educational experience and in learning outcomes.

While the Giovatto Library has worked to become more holistic in its approaches to Library collections, services, and spaces, and to keep an emphasis on becoming a Library for all of the students all of the time, each Library wishing to become more holistic in its approach and its vision of its students will do so in response to its unique local community.

Understanding the role of the Library not only in student research and coursework, but also in the lives of students during their college and university years, and as life-long learners, is the key to serving all of our students and the whole student.

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Special Collections Exhibitions

» How They Pay Dividends for Your Library

BY MICHAEL L. TAYLOR

If you curated a major library exhibition and no one came to see it, would you have wasted your time?

As strange as it may sound, asking an existential question like this is a good exercise in deepening our professional appreciation for the benefits exhibitions bring. It is natural and logical to place public learning outcomes at center stage when evaluating an exhibition's success or failure, and an exhibit without visitors would undoubtedly have been time misspent. That said, in focusing on how exhibitions measure up in the public eye, we should not overlook how they inform and advance other aspects of our work in special collections, work that indirectly benefits the public on many levels.

I began thinking about my own response to this question several years ago after overhearing a remark about how the exhibition program in the library where I worked at the time was not bringing in enough "foot traffic." Even though attendance was rising and the library was offering more exhibitions-related programming than ever before, I certainly had no objections to seeing more people come through our door. At the same time, I felt that such a one-dimensional definition of success would not capture everything the library's exhibitions were achieving, nor did I want it to become the only standard by which exhibitions were judged. Having worked behind the scenes on more than a dozen exhibitions, I could think of many good things that had come out of them, both for myself and others and the library as a whole, which would have happened regardless of the number of visitors we tallied on our log sheet. Weighing that comment led me toward a clearer understanding of the "hidden" outcomes of library exhibitions—outcomes that anyone whose job involves planning or advocating for exhibits should emphasize at every turn.

With so many competing demands on our time and resources, it may be tempting to place exhibitions low on the list of priorities or to reduce the amount of work put into them. How often, though, do librarians take a holistic view and fully consider what exhibitions contribute not only to the communities we serve, but also to our inner growth as professionals and to the inner workings of our institutions? In other words, how do exhibitions benefit library staff, library collections, and library operations *in addition* to library users? From this perspective, exhibitions offer many rewards besides their principal one of engaging and educating the public. Anyone familiar with the stock market knows that savvy investors prefer stocks that pay large dividends—money you get simply for owning a stock—even when share values decline. Such stocks buffer investors' portfolios and deliver returns no matter how good or bad the market is performing. Think of exhibitions in the same way. Though high returns in the form of an impressive gate count and meaningful visitor experiences is obviously every exhibition curator's primary goal, the dividends exhibitions pay on the side merit attention, too.

Unfortunately, because exhibition dividends are mostly qualitative, providing a detailed cost-benefit analysis for them is nowhere near as easy as analyzing quantifiable stock dividends. In one sense, this is a minor concern—they are bonuses that cost nothing more than what it would already cost to design and promote a large, high-quality exhibition with the public benefit in mind. Furthermore, because many of the most significant internal outcomes of library exhibitions are cumulative and rarely start flowing in all at once, it is unlikely that

the time and effort involved in formally assessing them will itself be worth the cost. The professional literature on exhibitions in special collections, or even in museums, has paid only passing attention to the soft benefits of exhibition planning that I have tried to compile a list of here; it is also quite open-ended about how to assess them, partly for the reasons I mention above.[1] The development of practical standards for a comprehensive assessment of exhibitions is a worthy research goal and perhaps one that *RBM's* readers should embrace—but it is not the purpose of this essay, which is simply intended to stimulate conversation about exhibition curatorship as a form of professional and organizational development. Even if such standards existed, I believe that, for the majority of special collections librarians, acknowledging and emphasizing the internal benefits of exhibitions up front, using them to guide the planning process, and simply allowing them to raise confidence that exhibitions are worthwhile, is good practice. Michael Belcher, an authority on museum exhibitions, comments: "What constitutes an effective exhibition will depend on the viewpoint, be it of the museum or of the visitor, and what it achieves for *them*."[2] The statement applies to libraries equally well.

LEARNING LABS FOR LIBRARIANS

There is an old saying that "To do two things at once is to do neither." While that may be a good rule of thumb, it is not absolutely true. In helping others learn about a topic, exhibition curators are expanding their own knowledge and professional skillsets. Instead of viewing exhibition galleries as public spaces, we could just as easily see them as learning labs where, through the process of curating exhibitions, librarians develop expertise that is useful later on. Whether they do this on their own or in collaboration with formally trained exhibitions professionals, the outcomes should be the same.[3]

Having enough time to learn about the contents of our collections in great detail is unfortunately a luxury not all librarians enjoy. One of the most attractive dividends that exhibitions pay is that they give library staff a dedicated amount of time to explore the materials in their care, as well as an excellent reason to do so. Though any staff member who visits an exhibition will take something away from it, if only a vague memory that the library has holdings in that area, the curator in particular will develop knowledge of what is on display and be a point of contact when questions regarding those materials come up in the future. These might include answering in-depth reference inquiries, talking to students, donors, or other visitors about materials from the exhibit, training new employees, and developing specific outreach strategies. Whether the exhibit curator is personally responsible for acquisitions or can recommend purchases to someone else, searching for materials to display often casts light on logical areas for collection development. What's missing? What would help tell this story better? Is there enough local interest to justify developing a new collecting area? The process of crafting an exhibition can point out the answers to questions like these.

The theme of the 2017 RBMS Preconference was "The Stories We Tell." Great storytelling skills, the speakers emphasized, must be a part of every special collections librarian's toolkit. Valerie Hotchkiss ended her opening plenary by quoting Rudyard Kipling, who believed that "If history were taught in the form of stories, it would never be forgotten." An exhibition is a terrific place to cultivate the skill of telling stories that stick in people's minds. Regardless of attendance, the curator will have learned something about communication that can be applied to other aspects of his or her job. For example, curating an exhibition teaches those with a highly academic background how to present information to a general audience. Developing an accompanying activity for children can likewise be an exercise in adapting a story for people with different levels of knowledge.

Another skill that exhibition planning nurtures is the ability to convey the essential facts in a few words. Librarians can apply this to other things that they write: grant proposals, press releases, blog posts, training manuals, even finding aids. Having staff who know how to craft a compelling story also positions them to work with donors. Dull facts and figures rarely inspire people with money or collections to give. Though donors give for many reasons, being touched by stories that connect to their own experiences or values is one of the most common. It is worth observing, too, that exhibitions provide stories in and of themselves about how library collections make a difference—stories that can be told again and again to potential supporters and partners.

I strongly believe that curating exhibitions makes librarians better teachers. Apart from becoming more adept at learning about unfamiliar subjects, my own work with exhibitions has helped me understand different learning styles. While some people learn best through self-paced reading, some learn visually, aurally, or in a group setting. For others, observing similarities and differences or even playing a game is helpful.[4] That knowledge has, in turn, led me to rethink the way I engage students in the classroom. Having searched for materials to include in exhibits, I have also gained a valuable perspective on the research process that informs my approach to library instruction. I have learned, for example, that sometimes one is better off using what is at hand rather than devoting an excessive amount of time to searching for the perfect source.

Another lesson that exhibitions have taught me that I try to pass on to students is the fact that library collections are more

multipurpose and multidisciplinary than they may appear. Flexibility, resourcefulness, persistence, a readiness to look in unexpected places, and the ability to see connections are skills I have honed by working on exhibitions. When I find myself trying to foster those skills in students encountering primary sources for the first time, the exhibitions I have curated provide examples of how to overcome the hurdles researchers face.

Other professional skills librarians cultivate by curating exhibitions include becoming better writers, critical thinkers, and public speakers. Some have reported gaining experience in managing issues involving controversy, intellectual freedom, freedom of expression, and library neutrality.[5] Tight deadlines are often part of the work, meaning that everyone involved in exhibitions learns something about time management. If library staff develop audio tours, promotional videos, or other digital components to an exhibit, greater expertise with technology and software can be yet another positive takeaway.[6]

SUPPORTING REFERENCE, INSTRUCTION, AND OUTREACH

One downside to exhibitions is that they are inherently temporary. Considering the amount of time and money that goes into them, librarians who want to stretch their investment and earn further dividends might think about ways to preserve an exhibit's descriptive content after the physical display comes down. Because of their usefulness as reference tools, exhibition catalogs are ideal products if your institution can afford them, but there are cheaper alternatives that still provide many of the same benefits in terms of getting extra mileage out of your work. Putting in-house exhibitions online is perhaps the best, for (despite hidden costs) it makes the content permanently available to both local and nonlocal researchers. However, depending on the situation, some may find reason simply to develop a workable method of filing exhibit labels or checklists at the reference desk to aid future researchers; doing this for labels could get somewhat messy because of the need for metadata, but cataloging a checklist is easily done and even an imperfect system of preserving descriptive content is better than nothing.

As mentioned above, an exhibition is an opportunity to educate library staff about what your collections hold and why those

materials are significant. Even staff members not involved in planning the exhibit will learn something from it. Reference librarians, in particular, will gain a better awareness of sources to recommend to researchers. Lack of knowledgeable staff, it goes without saying, can adversely affect customer service. Exhibitions are one way for staff, as well as outside experts, to share knowledge with each other. For new hires, who may feel frustrated at not being as familiar with a library's collections as more experienced personnel, exhibitions can be a component of staff training. Provided that the item labels and checklists are retained, they can also curtail the loss of knowledge when employees retire or move on to new jobs. An exhibition need never completely disappear just because it is no longer on display.

Library staff can also reuse exhibit labels and checklists to prepare for class visits. Identifying items to show on these occasions and coming up with comments is often no small task. Having ready-made notes and lists on hand will save time. Instructional materials developed for the exhibit can be repurposed in the same way for future classroom use; it is not uncommon, moreover, for exhibit curators, in working closely with collection materials, to find inspiration for new classroom activities involving primary sources.

Given the ongoing popularity of object-based learning, libraries can sometimes find it hard to accommodate the large number of requests to visit special collections, especially when those requests come from lecture courses with enrolments in the hundreds. Exhibitions can help. As long as the exhibit space is big enough, recommending that classes with a very high number of students visit the exhibition instead of having a customized class session can relieve some of the demands on library staff and facilities. A lecture course with several hundred students could visit in individual course sections, with a librarian making a few introductory remarks and then inviting the students to explore the items on display. Optional visits outside of class could be considered as well. Though substituting passive for hands-on instruction should obviously not be made a regular habit, there are times when an exhibit is self-explanatory and could stimulate a later class discussion or activity such as a reflective essay.

Do you ever struggle to come up with material for social media posts? Is it hard to maintain a regular schedule of posts? Once again, exhibitions can come to your aid. Since the curator has already identified eye-catching items and written labels, recycle some of those labels for social media. It can be as simple as modifying a few sentences and snapping a photo or two. Not only will this save time and put an exhibit to extra use, it will also help the library build a public following, gauge interest in a topic, and make the information available online.

SUPPORTING TECHNICAL SERVICES

The behind-the-scenes benefits of exhibitions extend to technical services as well. In researching materials to display and writing item descriptions, exhibition curators sometimes spot ways of improving catalog records. These might include correcting simple errors, adding new subject headings, or making note of overlooked copy-specific information, such as inscriptions or provenance. With archival collections, in particular, exhibitions may shed light on inadequately described content. For example, an exhibition related to women's history would likely involve looking for material in collections named after men, institutions, or organizations—collections where women's history is almost always present but may not have been highlighted for whatever reason during cataloging. Depending on what is found, the exhibition may provide the impetus to rewrite or expand the finding aid.

Curatorial review stemming from an exhibition can also pay off in regard to conservation and basic collection maintenance. In my own experience as an exhibition curator, I have discovered badly shelved or miss-

ing books, folders out of order, and items needing better housing or repairs, all while browsing for materials to display. Preparing items to go into exhibit cases, similarly, can be an opportunity to perform conservation treatments such as mending torn pages or encapsulating brittle items, steps that will benefit the materials long after the exhibition has ended. If a library does not employ or provide access to a conservator, an exhibition can supply a good reason for staff to educate themselves about conservation guidelines and standards.[7]

Exhibitions pay dividends in regard to digital services, too. If the materials on display have already been digitized, the exhibition (whether in-house or online) can draw potential users' attention to a digitization program and market its resources. In other words, exhibits can be the equivalent of storefront window displays. Some exhibitions may not advertise previously digitized material but still yield long-term digital components like online lesson plans, activities, or resource guides; digital humanities projects may grow out of them as well. A popular exhibit might also suggest materials for a library to consider digitizing. Did many visitors ask whether the materials are available online? Did some other need for digital access become clear? Furthermore, if there has already been institutional interest in digitizing a collection, an exhibition may provide evidence of public interest or other data that would make a case for moving forward.

EXHIBITING LIBRARY OPERATIONS AND VISION

Ultimately, a library exhibition displays more than tangible objects. A multidimensional view of exhibitions recognizes that they are an occasion to talk about what librarians do and why supporters should care. While that discussion can be held anywhere, exhibition galleries are the ideal place to do it because they are a point of convergence for so much of what goes on in special collections that outsiders seldom see. From things like cataloging and conservation to figuring out how to enrich students' academic experience and better serve diverse communities, exhibitions provide an array of talking points. "A business that makes nothing but money is a poor business," Henry Ford once observed. I would modify that a bit and say that an exhibit that shows off nothing but your collections is a poor exhibit or is at least one that could be improved. If a library is not using exhibitions to lead into conversations about larger institutional goals or issues, it is missing a golden opportunity.

There is a common piece of management advice that runs something along the lines of "never assume others know what you do." Even more than others, special collections librarians struggle in this regard. Despite the premise of this article, exhibitions are, in one sense, a risky bet. The idea that people who work in special collections have easy jobs that involve little more than trying to impress visitors with showy objects has diminished in recent years, but it still lingers. In curating exhibitions, we run the risk of sustaining the caricature of rare book librarians and archivists as privileged keepers of a horde of treasure that can only be viewed under glass. As much as possible, then, it is important that librarians approach exhibitions as an opportunity to educate people about the real work we do and why it matters.

One element of this involves showing how library work aligns with priorities of the university administration. In planning, promoting, and reflecting on exhibitions, it can be worth asking a question like: What keeps the president and provost up at night, and what is the library doing to make their jobs easier? For example, if an exhibition significantly contributes to institutional diversity initiatives, let administrators know. The same goes for other goals like attracting and retaining great faculty and students, generating revenue through gifts or grants, helping students find jobs, supporting extended education, and demonstrating the value of higher education. Connecting the dots between these "big picture" objectives and a library exhibition may repay the effort.

Establishing a vision for our collections and services is something librarians all invest a lot of time and energy in. Still, the way we see ourselves is not necessarily how others see us. A recent study undertaken for the Council on Library and Information Resources (CLIR) observes that "By producing exhibitions, special collections staff can produce their own narrative of the value of their collection...." How this takes shape varies widely but may include portraying ourselves as "producers of research rather than just collectors of research."8 No matter how a library defines the value of its collections—a definition that changes, based on context—exhibitions will bring that narrative to the wider world's attention.

RELATIONSHIPS

Another major way that exhibitions build on themselves is by fostering relationships. Even after an exhibit has ended, it is likely the people it brought together will continue to seek each other out well into the future. As Carole Ann Fabian, Charles D'Aniello, Cynthia Tysick, and Michael Morin have pointed out, exhibits can be "an enjoyable and effective focal point around which to build relationships ... and set the stage for collaborations and interactions having little in common with the events that initiated them."[9]

At the top of the list of relationships

» Other important relationships that exhibits support include those with booksellers. In my work in collection development, I have more than once had dealers contact me and recommend materials for acquisition after having seen announcements of exhibitions on the library website, via social media, or elsewhere. In one case, an exhibition advertised a new collecting area.

that exhibitions foster are those between library staff and library users. Faculty, students, researchers, and community members, on the one hand, learn from librarians about local holdings. Librarians, in return, learn from users about subject matter and receive feedback about how the collections can be of service.

Rapport with donors, of course, occasionally results from major exhibitions. Sometimes this stems from donors having been impressed by a library's collections, services, facilities, and staff. An exhibition might also highlight a need that a donor might be able to fill, whether by providing collections, funding, or some other form of support. It is important to include current students in the category of potential donors. As alumni, they may one day be in a position to give. Exhibitions also offer prospective donors who did not graduate from your institution a reason to visit campus.[10] Equally important are the relationships exhibits establish between librarians, development officers, and volunteer organizations such as a Friends of the Library group. Coming together around an exhibition that has been connected to a larger fundraising goal may help each party learn how to work with the others to achieve results.

The same is true for relationships with colleagues in general. From the initial planning stages to tidying up after the show is over, curating an exhibition is a complex and sometimes stressful operation. It can be as much an exercise in teamwork and good management as in educating the public. Who excels at what? Which staff members work well together? Which do not? What is the best way to communicate clearly and ensure goals are met? Is extra tact needed when critiquing someone's work? What does a particular employee need to be productive, successful, and happy? Independence? Guidance? Deadlines? Knowing the answers to these questions may inform one's overall approach to working with colleagues.

When it comes to strengthening relationships between special collections staff and coworkers in other parts of the library, here, too, exhibitions are a way of diversifying a broader strategy. Many special collections librarians have encountered colleagues in other library units who seem to have little awareness of primary sources and the academic literacies they support. A weak relationship in this regard can present a further challenge by negatively impacting the ability of special collections staff to secure internal resources. Though bridging this gap requires a multifaceted and sustained approach, inviting colleagues to collaborate on an exhibition is a place to start. It can help librarians outside of special collections increase their appreciation for local resources and, through personal experience, strengthen their understanding of why nonelectronic sources are important. This form of "inreach" can also bring in expertise that may otherwise be lacking and allow special collections staff to take advantage of existing relationships between subject librarians and the departments or communities they serve.

Other important relationships that exhibits support include those with booksellers. In my work in collection development, I have more than once had dealers contact me and recommend materials for acquisition after having seen announcements of exhibitions on the library website, via social media, or elsewhere. In one case, an exhibition advertised a new collecting area. Realizing he could be of help, a bookseller offered several items to my library that he had not yet listed for sale and that I was happy to purchase.

In addition to relationships between individuals, exhibitions can initiate new or stronger relationships with organizations, institutions, and campus offices. Inviting a K–12 group or local club to view an exhibit, for example, may lead to return visits, while partnering with a community organization to bring in a speaker or guest curator may likewise inspire something bigger. Though loaning collection materials to museums, historical societies, and other libraries can be logistically challenging, it can also bring rewards, such as expanding a library's audience or providing a bargaining chip for requesting loans in return. Working with the media can be equally challenging; but, once again, successful contacts with someone in university media relations, a newspaper reporter, or a writer for a local magazine will probably cause them to remember your name, making it easier to spread the word about library collections and events.

Some relationships are easier to build than others. One obstacle libraries sometimes face is an outdated or inaccurate image of their mission and/or collecting areas. This can happen with anybody but especially with senior faculty or older alumni who recall institutional priorities, policies, or arrangements from earlier times and circumstances.[11] Another obstacle is a legacy of negative relations between the library or its parent institution and a particular individual, department, or community. Exhibitions offer a potential fix. A thoughtfully designed, well-advertised exhibition is one of the best ways to show how a collection has grown, evolved, or been reoriented. It

» **Along with offering clear benefits for the library, exhibitions benefit the careers of library staff members. For some, it can be easy to get boxed into a narrow routine or set of responsibilities. Young professionals in particular can become frustrated when they want to take their careers to the next level but have trouble acquiring experience in areas outside of their job descriptions.**

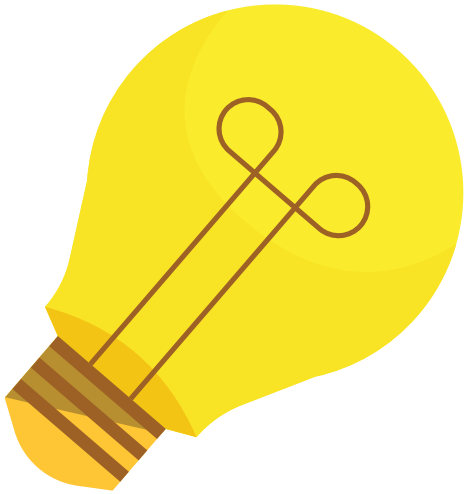
also underscores the emphasis on teaching and public engagement that special collections librarians now place at the forefront of their mission. Goals such as demonstrating a commitment to diversity and inclusion, indigenous perspectives, or voicing goodwill toward a group that may have been marginalized in the past can be achieved, in part, through exhibitions. They can also signal enthusiasm for a subject, both before and after a donation, opening the door to all kinds of future relationships.

SUPPORTING STAFF CAREERS

Along with offering clear benefits for the library, exhibitions benefit the careers of library staff members. For some, it can be easy to get boxed into a narrow routine or set of responsibilities. Young professionals in particular can become frustrated when they want to take their careers to the next level but have trouble acquiring experience in areas outside of their job descriptions. Assigning someone to work on an exhibition is one way for managers to be mentors and help their employees grow as professionals. For example, someone who is primarily responsible for cataloging might struggle to broaden his or her experience with outreach, instruction, conservation, donor relations, or implementing aspects of a strategic plan. Those whose jobs are weighted more heavily toward archives than rare books, or vice versa, might find themselves facing a similar challenge. Participating in exhibition development extends a helping hand by providing an opportunity to learn about tasks and formats that are not necessarily part of one's day-to-day routine.

An exhibition can also be seen as a relatively low-stakes experience that helps early-career librarians explore what it takes to be a leader. After all, the skills and traits of a good exhibition curator and a good library manager are much the same. These include the ability to communicate clearly to a wide audience, articulate the importance of library resources, seek buy-in from others, interact with donors and the media, and manage a budget. Other leadership skills it is possible to hone through working on a large exhibition include knowing how to establish objectives, encourage teamwork, rely on staff expertise, deal with conflict, navigate bureaucracy, suggest improvements, and accept criticism.[12] Not least of all, taking the lead on an exhibition can provide experience advocating for one's staff, one's users, and oneself. Even if an employee never curates another exhibition, these will be crucial skills to have practiced.

In terms of helping someone develop his or her CV, dossier, or portfolio, exhibition curatorship demonstrates creative activity and engagement with an institution's collections and clientele. This is true not only for library staff but also for the people we collaborate with, including students, interns, and professors. The main display itself, of course, can be listed, but it could easily serve as a launch pad for additional accomplishments such as presentations, conference papers, articles, and other things that might help someone earn tenure or move into a higher position.[13] Whether or not advancement is a requirement or concern, exhibitions can still enhance job satisfaction and morale. At times, working on an exhibit can offer relief from what may feel like mind-numbing administrative or technical tasks. At others, it can be a chance to learn something new or share one's passion for a subject. Of all the good things that come out of exhibitions, this, to me, is among the most important. After all, if we as librarians aspire to nurture the creative and investigative spirit in others, shouldn't we take steps to keep it alive in ourselves?



CONCLUSION

The "hidden" outcomes of major library exhibitions are actually not hidden at all. We just need to adjust our eyes and see them as elements of a cohesive whole. What strategies can librarians adopt to show that, in curating exhibitions, we often accomplish more than we set out to do? A post-exhibition survey is one I have begun experimenting with and recommend. Though intended only for my own use, it helps me collect information, understand how an exhibition may have been particularly effective, and think strategically about how to achieve similar results in the future. Ask questions that encourage people involved with an exhibit to reflect on how it benefited the library on an internal level and contributed to their own professional development. Some benefits will be small and others tentative, but including them in the bigger picture will help spell out the reasons for maintaining and even expanding an exhibition program.

Benjamin Franklin once remarked that

» **The "hidden" outcomes of major library exhibitions are actually not hidden at all. We just need to adjust our eyes and see them as elements of a cohesive whole. What strategies can librarians adopt to show that, in curating exhibitions, we often accomplish more than we set out to do? A post-exhibition survey is one I have begun experimenting with and recommend.**

"An investment in knowledge pays the best interest." One of our jobs as advocates for library exhibitions is to point out how they enhance knowledge across a broad spectrum that extends well beyond the visitor experience. From there, we can demonstrate why exhibitions, from a library leadership perspective, are a smart place to put money and watch the profits roll in. Fortunately, those profits are not hard to find, and simply making an effort to account for them in the bottom line will make winning the confidence of future investors in knowledge that much easier. ■

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2 . Michael Belcher, *Exhibitions in Museums* (Washington, D.C.: Smithsonian Institution Press, 1991), 201.

3 . According to a 2010 ARL survey, "Only 22 percent of institutions have a staff member for whom exhibitions are a primary responsibility. Postings between 2012 and February 2015 at the ARL Position Description Bank Project, which aggregates position descriptions posted by its member libraries, includes only 20 positions at seven institutions whose primary job responsibility is exhibition work." Amy H. Chen, Sarah Pickle, and Heather L. Waldroup, "Changing and Expanding Libraries: Exhibitions, Institutional Repositories, and the Future of Academia," in *The Process of Discovery: The CLIR Postdoctoral Fellowship Program and the Future of the Academy,* eds. John C. Maclachlan, Elizabeth A. Waraksa, and Christa Williford, CLIR Pub 167 (Sept. 2015), 62–81.

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The Library Assessment Capability Maturity Model

» A Means of Optimizing How Libraries Measure Effectiveness

BY SIMON HART AND HOWARD AMOS

INTRODUCTION

The improvement of processes has become increasingly important in libraries, especially within the higher education context. This has been in response to wider economic pressures that have seen limited budgets and the rise of accountability (Lilburn, 2017). Libraries have prioritized the need to demonstrate a return on investment, show that users' needs are being met, remain relevant, offer (added) value, and align with wider strategic imperatives (Matthews, 2015; Oakleaf, 2010; Sputore & Fitzgibbons, 2017; Tenopir, Mays & Kaufman, 2010; Urquhart & Tbaishat, 2016). A drive for efficiency and effectiveness has culminated in calls to foster cultures of quality, assessment, and evidence based decision-making (Atikinson, 2017; Crumley & Koufogiannakis, 2002; Lakos & Phipps, 2004). Business as usual is no longer enough. Doing more with less while continuing to improve is the new norm. Applying assessment processes and improving upon them has become imperative for library mangers (Hiller, Kyrillidou, & Oakleaf, 2014). The challenge is how can assessment be conducted and improved efficiently and effectively. This paper documents the development of a tool—the Library Assessment Capability Maturity Model (LACMM)—that can meet this need.

LITERATURE REVIEW

The issue of library assessment is well documented (Heath, 2011; Hufford, 2013; Town & Stein, 2015). Signposts, "how to" manuals, and examples of practice are readily available (Oakleaf, 2010; Wright & White, 2007). A range of comprehensive books have been published (Appleton, 2017; Brophy, 2006; Heron, Dugan, & Nitecki, 2011; Matthews, 2015).

The tools to measure effectiveness are continually evolving—from the questionnaire employed by the Advisory Board on College Libraries across Carnegie libraries in the 1930s (Randel, 1932) to Orr's framework for quantitative measure for assessing the goodness of library services (Orr, 1973) to more contemporary tools like LibQual+® surveys (Association of Research Libraries, 2012) and web based assessment tools offered by Counting Opinions (n.d.). Significant investment has been made to strengthen librarians' assessment practices, for example through the ACRL program *Assessment in Action: Academic Libraries and Student Success* (Hinchliffe & Malenfant, 2013). Work has been undertaken to identify factors important to effective library assessment (Hiller, Kyrillidou, & Self, 2008) as well as to identify factors influencing an assessment culture (Farkas, Hinchliffe, & Houk, 2015). In discussing the history of library assessment, Heath (2011) noted that "recent years have seen a collaborative culture of assessment reach its full maturity" (p. 14).

Despite the rich literature that exists on assessment practices, the concept of maturity in assessment has only received limited attention in libraries. Cosby (1979) popularized the concept of maturity of business processes by considering them in stages building on each other, offering an effective and efficient means for the analysis and measurement of the extent to which a process is defined, managed, assessed, and controlled. The application of capability maturity within a framework emerged out of the software engineering industry where Paulk, Curtis, Chrissis, and Weber (1993) conceived a Capability Maturity Model (CMM). Subsequently, CMMs have been applied in a range of other industries and organizations to assess the level of capability and maturity of critical processes, such as project management capability (Crawford, 2006), people capability (Curtis, 2009), and contract management process capability (Rendon, 2009).

A CMM has five levels of capability maturity, as illustrated in Figure 1 (adapted from Paulk, Curtis, Chrissis, & Weber, 1993). Each level represents a measure of the effectiveness of any specific process or program, from ad-hoc immature processes to disciplined, mature, and continuously improving processes. The CMM provides criteria and characteristics that need to be fulfilled in order to reach a particular maturity level. Actual activities are compared with the details at each level to see what level these best align to. Consideration of the details in the levels above where activities align provide guidance on where improvement can be made (Becker, Knackstedt, & Pöppelbuß, 2009).

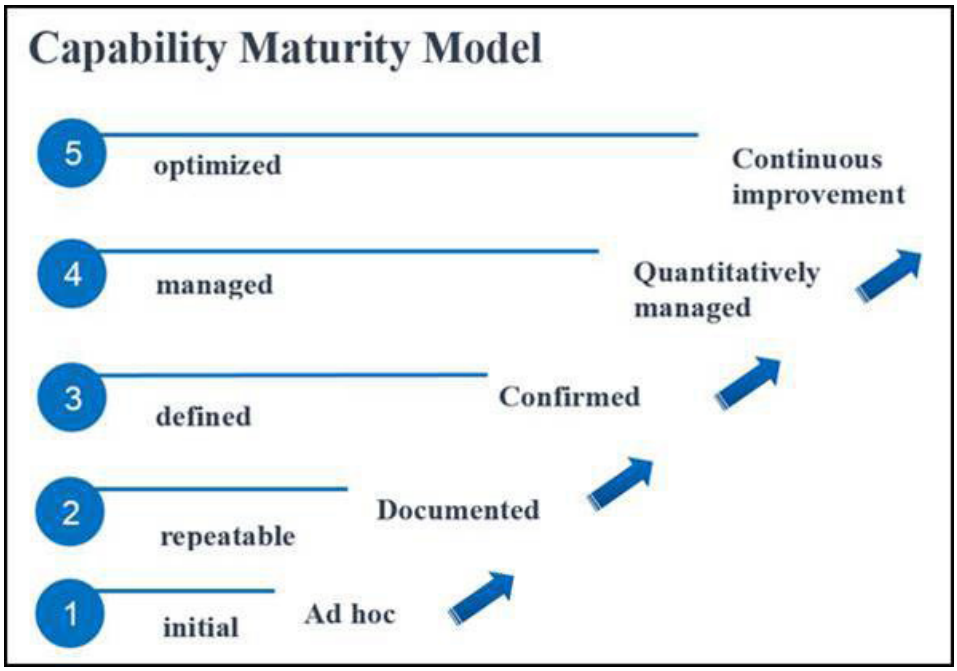

Figure 1. Capability maturity model.

The first reported instance of the CMM being utilized in developing a maturity model in a library setting was by Wilson and Town (2006). Here the CMM was used as a reference model to develop a framework for measuring the culture of quality within an organization. As part of her doctoral research, Wilson (2013) went on to develop a comprehensive and useful Quality Maturity Model (QMM) and Quality Culture Assessment Instrument for libraries (**www.qualitymaturitymodel.org.uk**). Subsequently the CMM has been used to develop maturity models in library settings to map knowledge management maturity (Mu 2012; Yang 2009, 2016) and digital library maturity (Sheokhshoaei, 2018). Only Wilson (2013) and Sheokhshoaei (2018) provided a detailed account of how their model was developed.

There are other instances of developing maturity models in a library setting. Gkinni (2014) developed a preservation policy maturity model; however, this used a maturity assessment model promoted by de Bruin and Rosemann (2005). Howlett (2018) has announced a project to develop an evidence based maturity model for Australian academic libraries. It will describe characteristics of evidence based practice and identify what library mangers can implement to progress maturity at a whole organization level. At this stage, it is not known whether this will follow the structure of the CMM.

There are limited instances of the application of CMMs within the library literature. An early version of the QMM was applied by Tang (2012) in benchmarking quality assurance practices of university libraries in the Australian Technology Network. Egberongbe and Willett (2017) refer to an assessment of quality maturity level in Nigerian university libraries that applied the Prince 2 Maturity Model from the field of project management. Similarly, within a university library in Sri Lanka, Wijetunge (2012) reported using a version of a knowledge management maturity model; however, like Willett (2017), this also did not apply a CMM in its development.

AIMS

This paper shares the LACMM, a tool that can assist library mangers with improving assessment. The LACMM offers managers an effective tool where, through a process of self-review, assessment processes can be simplified and considered in a stage-by-stage manner along an anticipated, desired, and logical path to identify how well developed and robust processes actually are. It offers efficiency as it acts as a diagnostic tool that helps to identify a course of action to optimize performance. The process of developing this tool is presented with an evidence trail to foster confidence in its utility and value.

METHODS

The LACMM was developed during a series of library benchmarking activities across a group of seven universities from across the world, the Matariki network (**https://matarikinetwork.org/**). The authors of this paper coordinated the development of the LACMM and managed the benchmarking activities. One author is a library director (H.A.) and the other (S.H.) has assessment responsibilities as a significant component of his role. The network libraries shared in the development of the LACMM as they addressed the following question: If we enable and support the academic endeavour, how do we measure our effectiveness? Guidance was taken from Becker, Knackstedt, and Pöppelbuß (2009), who offered a procedures model for developing maturity models that draws on design science research methodology (Hevner, 2004). This provided a clear flow of activities and decision-making junctures, emphasising an iterative and reflective approach.

The benchmarking activities included structured case studies from each of the university libraries that were assessed and best practice examples and resources that were shared. Decisions were made through consultation via shared discussion documents. These conversations occurred during three day-long annual meetings between 2013 and 2017 when the seven library directors met as part of a series of Matariki Humanities Colloquia that had emerged as part of the network activities. Prior to each meeting staff from the libraries responded to a series of questions with reference to their library's case study. The responses were shared via an online collaborative workspace. Using the workspace allowed each library to come to the activity as resources allowed. Each case study could be reviewed prior to the meeting where more questions could be answered and each library could report on what they learned from considering each other's best practice examples. This process ensured a rich and productive interaction during the meetings (Hart & Amos, 2014).

Benchmarking topics focused on activities and practices for library programs that supported teaching, research, and the student experience. Aligned to wider strategic priorities, the topics included transition of first year students to university life, library space that support students' experiences, planning for change to support research, how the library helps researchers measure impact, and the cost and contribution to the scholarly supply chain. As the library directors considered possible areas of improvement, the need to improve assessment processes was acknowledged. Early on in the benchmarking process, the library directors agreed to investigate, as a separate but aligned activity, the use of a CMM for library assessment as a shared response to address "how we measure our effectiveness" (Hart & Amos, 2014, p. 59).

To encourage wide application of the tool, the authors promote the use of terms "assessment" and "evaluation" as interchangeable within the library context. While some argue for a distinction between assessment and evaluation (Hernon & Dugan, 2009) it needs to be recognized that this call is made within the context of higher education, where historically care has been taken to differentiate between assessing learners and evaluating things or objects (Hodnett, 2001). In contrast, Hufford (2013) concedes that among librarians the use of each term is ambiguous, and their uses have changed over time.

RESULTS

Problem Definition

The idea of developing a guide or roadmap that a CMM could offer appealed to the library directors within the network. They acknowledged that there were plenty of good case studies, resources, and lists of what had to be in place to advance a culture of assessment. For example, see bibliographies by Hufford (2013) and Poll (2016). While these are useful to learn about what others are doing, they did not offer systematic guidance on how to improve assessment processes within current and planned activities and programmes. It was confirmed that testing the model across a group of international libraries would strengthen its application to a wider audience (Maier, Moultrie & Clarkson, 2012; Wendler, 2012).

Applying the CMM to library assessment was further validated when one of the partner libraries shared their experience using the revised Australasian Council on Online, Distance and e-Learning (ACODE) benchmarking tool, which focuses on technology-enhanced learning (McNaught, Lam, & Kwok, 2012; Sankey, 2014a). The ACODE tool

includes eight benchmarks with each containing a series of criteria-based performance indicators using a 1 to 5 scale of capability. It comprises a two-phased application, where it is applied in a self-assessment process and then used to develop a team response within or between institutions (Sankey, 2014b). This example was useful as it allowed the library directors to conceptualize what a LACMM may look like and how it may be utilized. It was recognized that through the benchmarking activities the library directors could review their assessment processes against criteria, compare with what others had done, and draw upon this to improve practices.

Library Assessment Capability Maturity Model

Levels of capability	Stages of the Assessment cycle: Objectives	Methods and data collection	Analysis and Interpretation	Use of results
Optimized				
Managed				
Defined				
Repeatable				
Initial				

Figure 2. Library assessment capability maturity model template.

Comparison with Existing Models

Having defined the problem and agreed upon an approach, the next stage of the procedures model required comparison with existing models. Here Wilson's (2013) comprehensive QMM was considered. The QMM included 40 elements grouped into 8 facets. Those elements that focussed on assessment processes included progress monitoring, performance measurement, gathering feedback, collation of feedback, responding to feedback, and acting on feedback. Despite this focus, the QMM was rejected for this activity because of its complexity and size. The aim was to provide an efficient tool that would not overwhelm those using it. It was also rejected because overall the facets did not provide direct alignment to library assessment. Instead, it focused on the broader concept of quality of which assessment is a smaller part. It was noted that, when it came to assessment, the QMM tended to focus more on feedback and not on assessment as a process. As noted earlier, with no other suitable model dealing with the issue of library assessment available, the need to develop a distinctive LACMM was confirmed.

Iterative Model Development

To provide guidance in determining the characteristics of a LACMM, the literature on library assessment was reviewed. Bakkalbasi, Sundre, and Fulcher's (2012) work on assessing assessment was considered. In presenting a toolkit to evaluate the quality and rigor of library assessment plans, their work draws on the elements of the assessment cycle. The elements include (1) establishing assessment objectives, (2) selecting and designing methodologies and collecting data, (3) analyzing and interpreting data, and (4) using the results. It was decided that focusing on these elements would reduce the complexity of the design and simplify the development of the LACMM. A template of the LACMM was determined, as illustrated in Figure 2.

The LACMM template was shared with library managers and assessment practitioners at international forums. Presentations were made at the 11th Northumbria International Conference on Performance Measurement in Libraries and Information Services 2015, the OCLC 7th Asia Pacific Regional Council Conference 2015, and the Council of Australian University Librarians Forum: Demonstrating and Measuring Value and Impact 2016. During the discussions at these presentations, attendees confirmed the utility, value, and simplicity of the model (Amos & Hart, 2015; Hart, 2016; Hart & Amos, 2015).

As part of the shared development of the LACMM, each library in the Matariki network was invited to populate the model as an additional part of a benchmarking activity. They were asked to consider the assessment applied in the case study they were reporting on in the benchmarking activity, to rank the level of capability for each stage of assessment in the project, and then to provide notes of the criteria for each of these. When only three of the seven libraries completed this task with varying degrees of success, the project lead decided to change tack to get more buy in. The decision was made, in line with the iterative nature of the procedures model, that a group of library staff at the University of Otago would draft criteria for the network libraries to consider in the next benchmarking activity.

The Otago staff selected for this task all had experience in either business management and or assessment roles. They included the University Librarian, the Resources Assessment Librarian, the Library Programmes Manager, and the Policy Planning and Evaluation Librarian. Drawing on their practice and knowledge, these staff met several times to discuss, develop, and revise criteria. Following this, a draft version was then tested with the staff at Otago who were responsible for undertaking the next benchmarking activity.

In reviewing the version completed by Otago staff as part of the benchmarking activity, the project lead noted that a number of different kinds of assessment activities had been documented. Furthermore, the different types of activities were reported on in the different assessment stages of the LACMM. For example, survey data were covered in objectives, methods, and results, while group interviews were reported on in analysis. Reflecting on this, the project lead decided to use the Otago criteria group to produce three versions of the model for different types of assessment activities. The wording of the criteria in each corresponded to the particular assessment activity:

1. Data, to cover assessment activities that included usage data and surveys
2. Discussion, to cover assessment activities that included group interviews and focus groups
3. Comparison, to cover assessment activities that included benchmarking, case studies, standards, or best practice examples

To add more clarity, descriptions were provided for each of the levels of capability maturity and the stages of the assessment cycle (see Figures 3, 4, and 5). These three versions were then distributed to the Matariki Libraries as part of the next benchmarking activity.

Testing the Model

Distributing three versions of the LACMM, including specific criteria for each, proved a successful strategy with six of the seven libraries completing them. The library that did not submit indicated that the project they reported on did not lend itself to assessment activities. Overall, four libraries reported on one type of assessment activity that was applied in the project, and two libraries reported on two types of activities. Each library ranked their capacity maturity across each of the four stages of the assess-

Library Assessment Capability Maturity Model: Data

Assessment activities: usage data / survey		Stages of the Assessment cycle			
		Objectives: Establishing a clear and shared idea of what is to be achieved from the assessment	**Methods and data collection:** Selecting and designing methodologies and collecting data	**Analysis and Interpretation:** Describing and making sense of the results	**Use of results:** Communicating and applying results in the realization of benefits and in the improvement of services
Levels of capability maturity	**5. Optimized:** Continuous process improvement is enabled by quantitative feedback from the process and from piloting innovative ideas and technologies.	Setting objectives is data driven. Wider trends are considered.	The optimum methods and data collection are used.	There is an analysis of trends. Predictive analysis is employed.	Data drives planning. Use of data and subsequent change is reported.
	4. Managed: Detailed measures of the process and product quality are collected. Process and product are quantitatively understood and controlled.	Objectives are monitored as part of quality improvement.	There are multiple methods and data collected. Methods and data collection are measured and reviewed.	Data analysis methods are measured and reviewed.	Data is applied in planning. The audit trail is transparent and it is reported .
	3. Defined: Processes are documented, standardized and integrated. All instances use an approved tailored process.	There is an identified and well documented gap in your existing data. There are clear research questions being examined. Objectives align with methods and analysis.	Data collection is organized to meet assessment objectives. Data collection is valid, reliable and reproducible.	Data analysis methods are documented. Bias is taken into account. Others will get same interpretations from the data.	There are established ways of making data available. There is an audit trail of how results are applied.
	2. Repeatable: Basic processes are established to track resourcing, scheduling and function. Can repeat earlier success that are similar.	There is limited documentation of the need for data. There is a general understanding of the need to collect data.	Some data is collected on a regular basis. There may be some purpose for collecting the data that aligns with the objective.	Data analysis methods can be repeated but are not reviewed.	There is some reporting of the data. There is a limited audit trail of how results are applied.
	1. Initial: Processes are ad hoc and occasionally even chaotic. Few processes are defined and success depends on individual effort and heroics	There is no priority of the need for data. Data may be collected on a case by case basis.	Processes are not clear or reproducible. The reason for collecting the data may not necessarily align with the assessment objectives.	Data is selected to align with the outcome you are looking for.	Results are not feedback / reported. There is no audit trail of how results are applied

Figure 3. Library assessment capability maturity model for data.

ment cycle, providing evidence about how they met the criteria.

Applying the model provided each library the opportunity to review their performance and see where they could improve. Following this, each of the libraries' responses were shared among one another and then discussed at a face-to-face meeting. This meeting provided the opportunity to clarify any issues and seek more tacit information from each other on assessment processes and resources—in particular, from those who scored a higher level of capability maturity.

At the meeting, feedback on the criteria and templates for different assessment processes in the LACMM were received and then confirmed. Feedback primarily focused on the wording used. Fine tuning terminology across a group of international libraries helped to provide wider appeal and utility. The library directors agreed that having a template for different kinds of assessment activities assisted their staff to complete the model in the first instance. However, as their staff become familiar with using the LACMM, the directors agreed that using one generic version for any type of assessment activity would be sufficient. The directors confirmed the usefulness of the tool and decided that they had sufficiently addressed the question of how they measure their effectiveness. Having built a structure and precedence for collaborating and sharing resources through the benchmarking activities, the directors agreed to refocus on other projects that support scholarly communications and digitizing collections. Nevertheless, most committed to applying the LACMM in projects at a local level. Two directors commented that it was hard to get their staff interested in participating in benchmarking. However, it was acknowledged that within the activities each partner had the flexibility to come to the benchmarking as resources allowed. As Town (2000) asserts, "benchmarking is as much a state of mind as a tool; it requires curiosity, readiness to copy and a collaborative mentality" (p. 164).

In line with the procedure model, further testing of the generic LACMM was carried out when it was shared with the Council of Australian University Librarians Value and Impact Group. The group acts as a community of practice with practitioners from New Zealand and Australian university libraries with a quality or communication role. Overall the practitioners confirmed its utility and value. They suggested including more examples in the assessment activities and that brief "how to" instructions be included. The generic version that resulted from this testing is shown in Figure 6. When advancing to using the generic LACMM, it is useful to understand that the term "data" used in each of the criteria statements refers to "what is collected from each of the different assessment activities."

DISCUSSION

Put simply, the LACMM is designed to assist library managers in assessing their assessment activities and in identifying how these can be improved until they are optimized through continuous improvement. In the first application of the LACMM, there is benefit in using a recent piece of work or an example that is considered leading practice. Managers can choose a piece of work that included assessment activities or that was an assessment activity. For example, the assessment activity could be something that was carried out to inform an initiative or to review the effectiveness of an initiative.

Once a piece of work has been selected, the next step is to identify the kinds of assessment activities that were applied in

Library Assessment Capability Maturity Model: Discussion

Assessment activities: group interview / focus group		Stages of the Assessment cycle			
		Objectives: Establishing a clear and shared idea of what is to be achieved from the assessment.	**Methods and data collection:** Selecting and designing methodologies and collecting data.	**Analysis and Interpretation:** Describing and making sense of the results.	**Use of results:** Communicating and applying results in the realization of benefits and in the improvement of services.
Levels of capability maturity	**5. Optimized:** Continuous process improvement is enabled by quantitative feedback from the process and from piloting innovative ideas and technologies.	Setting objectives is drive by the results from the analysis of the views and ideas of others. Wider trends are considered.	The optimum methods are used in discussion with others to collect their views and idea.	There is an analysis of trends. Predictive analysis is employed.	The results from the analysis of the views and ideas of others drives planning. Use of the results from the analysis of the views and ideas of others and the subsequent change is reported.
	4. Managed: Detailed measures of the process and product quality are collected. Process and product are quantitatively understood and controlled.	Objectives are monitored as part of quality improvement.	There are multiple methods used in discussion with others. Methods and processes used to collect the views and ideas of others are measured and reviewed.	Methods used to analyse the views and ideas of others are measured and reviewed.	The results from the analysis of the views and ideas of others is applied in planning. The audit trail is transparent and it is reported
	3. Defined: Processes are documented, standardized and integrated. All instances use an approved tailored process.	There is an identified and well documented gap in your need for the views and ideas of others. There are clear research questions being examined. Objectives align with methods and analysis.	Collecting the views and ideas of others is organized to meet assessment objectives. Processes used in the discussions with others are valid, reliable and reproducible. Methods for identifying participants are understood and consistently applied.	Methods used in the analysis of the discussions with others are documented. Bias is taken into account. Others will get same interpretations from the analysis of the views and ideas of others.	There are established ways of making the results from the analysis of the views and ideas of others available. There is an audit trail of how results are applied.
	2. Repeatable: Basic processes are established to track resourcing, scheduling and function. Can repeat earlier success that are similar.	There is limited documentation of the need for input from others. There is a general understanding of the need to collect the views and ideas of others.	Some views and ideas of others is collected on a regular basis. There may be some purpose for your discussion with others that aligns with the objective.	Methods used to analyse the views and ideas of others can be repeated but are not reviewed.	There is some reporting of the results from the analysis of the views and ideas of others. There is a limited audit trail of how results are applied.
	1. Initial: Processes are ad hoc and occasionally even chaotic. Few processes are defined and success depends on individual effort and heroics	There is no priority of the need for input from others. The views and ideas of others may be collected on a case by case basis.	Processes used in discussion with others are not clear or reproducible. The reason for collecting the views and ideas of others may not necessarily align with the assessment objectives.	The views and ideas of others are selected to align with the outcome you are looking for.	Results from the analysis of the views and ideas of others are not feedback / reported. There is no audit trail of how results are applied.

Figure 4. Library assessment capability maturity model for discussion.

terms of data, discussion, or comparison (see Figures 3, 4, and 5). Then, for each kind of assessment activity, managers should make notes on what was carried out at each stage of the assessment cycle, including Objectives, Methods and data collection, Analysis and interpretation, and Use of results. These notes should then be compared with the criteria listed at each level of capability maturity from the Initial level upwards to the Optimized level for each of the stages of the assessment cycle. All of the criteria at a particular level must be met for that level to be attained. This comparison should be carried out for each kind of assessment activity applied in the piece of work.

When managers are familiar with using the LACMM for the different kinds of assessment activities, they can then move to using the generic model. Here it is useful to understand that the term "data" refers to "what is collected for each of the different assessment activities."

When comparing a piece of work, managers may identify that the first three elements of the assessment cycle meet the criteria for the Defined level because the assessment processes in the piece of work are documented, standardized, and integrated. However, when it comes to the Use of results, what was carried out may only meet the criteria for the Repeatable level. For example, the piece of work may have inconsistent reporting with no audit trail of how results are applied. For guidance on improving this element, a manager can review the criteria in the Capability level and apply those criteria in the next project. In addition, managers, especially those who attain projects with higher levels of capability, could share their experiences of using the LACMM and the processes and resources they applied.

Having applied the LACMM to a representative range of assessment activities, a manager can characterize their whole assessment program. This may be a useful exercise to help set targets for improving capability across the library or for benchmarking. However, as was seen through testing the LACMM, comparing examples of leading practice where tangible examples could be shared was also beneficial.

The LACMM has advantages over other tools and processes available. In only considering the four stages of the assessment cycle, the LACMM is not as complex as Wilson's (2013) QMM, which includes 40 elements grouped into 8 facets. By focusing on assessment processes in a stage-by-stage manner, self-review is simplified. The LACMM offers efficiency as both a self-review tool and as a means of identifying improvements. Although this tool will add to the plethora of resources already available (see Farkas, Hinchliffe, and Houk, 2015 and Hiller, Kyrillidou, and Self, 2008), the simplicity of the tool as a means of assessing assessment and identifying an improvement path is its strength. It can act as a quick aide-mémoire and form the basis of a comprehensive self-review or an inter-institutional benchmarking project (Sankey, 2014b).

The benchmarking exercises provided a unique opportunity to develop the LACMM where it could be applied and tested against actual case studies of best practice across an international group of university libraries. The development utilized staff experience at different levels of the organization, including both practitioners and leaders. The results at decision-making junctures were verified at international forums of library managers and assessment practitioners. Drawing on design-science research

Library Assessment Capability Maturity Model: Comparison

Assessment activities: benchmarking / case studies / standards / best practice		Stages of the Assessment cycle			
		Objectives: Establishing a clear and shared idea of what is to be achieved from the assessment	**Methods and data collection:** Selecting and designing methodologies and collecting data	**Analysis and Interpretation:** Describing and making sense of the results	**Use of results:** communicating and applying results in the realization of benefits and in the improvement of services
Levels of capability maturity	**5. Optimized:** Continuous process improvement is enabled by quantitative feedback from the process and from piloting innovative ideas and technologies.	Setting objectives is driven by the results from comparing and reviewing services. Wider trends are considered.	The optimum methods for comparing and reviewing services are used.	There is an analysis of trends. Predictive analysis is employed.	The results from comparing and reviewing services drives planning. Use of the results and the subsequent change is reported.
	4. Managed: Detailed measures of the process and product quality are collected. Process and product are quantitatively understood and controlled.	Objectives are monitored as part of quality improvement.	There are multiple methods applied when comparing and reviewing services. Methods are measured and reviewed.	Processes for considering the details from comparing and reviewing services are measured and reviewed.	The results from comparing and reviewing services is applied in planning. The audit trail is transparent and it is reported.
	3. Defined: Processes are documented, standardized and integrated. All instances use an approved tailored process.	There is an identified and well documented gap in your knowledge and understanding of how your service compares with others best practice. There are clear research questions being examined. Objectives align with methods and analysis.	Methods for comparing and review of services is organized to meet assessment objectives. Methods used to compare and review services are valid, reliable and reproducible.	Processes for considering the details from comparing and reviewing services are documented. Bias is taken into account. Others will get the same interpretations from the details.	There are established ways of making the results from comparing and reviewing services available. There is an audit trail of how results are applied.
	2. Repeatable: Basic processes are established to track resourcing, scheduling and function. Can repeat earlier success that are similar.	There is limited documentation of the need for comparing and reviewing services. There is a general understanding of the need to compare and review services.	Some comparing and review of services is carried out on a regular basis. There may be some purpose for the comparison and review that aligns with the objective.	Processes for considering the details from comparing and reviewing services can be repeated but are not reviewed.	There is some reporting of the results from comparing and reviewing services. There is a limited audit trail of how results are applied.
	1. Initial: Processes are ad hoc and occasionally even chaotic. Few processes are defined and success depends on individual effort and heroics	There is no priority of the need to compare and review services. Comparing and reviewing services may be undertaken on a case by case basis.	Processes are not clear or reproducible. The reason for comparing and reviewing services may not necessarily align with the assessment objectives.	Details from comparing and reviewing services are selected to align with the outcome you are looking for.	Results from comparing and reviewing services are not feedback / reported. There is no audit trail of how results are applied.

Figure 5. Library assessment capability maturity model for comparison.

methodology (Hevner, 2004) was also beneficial. The iterative approach allowed methods to be trialled and revised as required. The schedule of annual meetings with each benchmarking exercise stretched over a year provided ample time for reflection in the shared development of the LACMM as a useful artifact. Being flexible with timeframes allowed each partner to come to the exercise as resources allowed (Hart & Amos, 2014). The successful use of the design science research methodology demonstrates the potential of this approach to other library and information practitioners.

Several limitations to the LACMM and its development must be acknowledged. First, the LACMM is sequential in nature and represents a hierarchical progression. Some may argue that real life is not like that. Some may legitimately be content to be at a certain level and not prioritize resourcing to improve practice. Second, the authors acknowledge that bias may have influenced the development of the LACMM because it became the only means for participating libraries to respond to the question of how they measure their effectiveness. However, when deciding this path, no other options were put forward by other network partners. Third, limitations exist because the LACMM was developed solely within the context of university libraries. Input from other areas within the wider library and information management sector would provide additional insight into the relevance and usefulness of the LACMM.

The LACMM does not replace the comprehensive and useful QMM as a means of assessing the quality of library quality (Wilson, 2015). It does, however, provide an effective and efficient means of assessing library assessment.

CONCLUSION

The LACMM is an effective tool that, through self-review assessment processes, can be simplified and considered in a stage-by-stage manner along an anticipated, desired, and logical path to identify how mature assessment processes actually are. Managers can compare their effort with each level of capability maturity from the *Initial* level through to the Optimized level across each of the four stages of the assessment cycle (*Objectives, Methods and data collection, Analysis and interpretation,* and *Use of results*. The LACMM offers efficiency as it acts as a diagnostic tool that helps identify a course of action to improve performance. Criteria at each level of capability maturity at the particular stage of the assessment must be met to move up a level. The level above a particular stage provides guidance on how assessment process can be improved.

It is anticipated that providing the evidence trail of the development of the LACMM will further foster confidence in its utility and value. It is expected that the tool will be adapted and improved upon as library managers apply it. As this resource is being shared with a Creative Commons Attribution–NonCommercial–ShareAlike license, it will support other practitioners in sharing their work with and improving the LACMM as a means of optimizing how libraries measure their effectiveness. ■

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Naku te rourou nau te rourou ka ora ai te iwi.

Library Assessment Capability Maturity Model: Generic

This tool is designed to assist Library managers in assessing their assessment activities and identifying how these can be improved until they are optimized. By considering each of the different kinds of assessment activities applied in a piece of work a manager can compare their effort with each level of capability maturity across each of the four stages of the assessment cycle; Objectives, Methods and data collection, Analysis and interpretation, Use of results. The criteria at each level of capability maturity at the particular stage of the assessment must be met to move up a level, from 1. Initial through to 5. Optimizing. By reviewing the criteria above what was achieved a manager should identify what needs to change and be applied in the next piece of work. It is useful to relate the term 'data' used in each of the criteria statements to refer what you collect / gather from each of the different assessment activities.

Assessment activities: usage data / observation / service blueprint/ journey map / usability study / survey / group interview / focus group / benchmarking / case studies / expert view / standards / best practice	**Stages of the Assessment cycle**			
	Objectives: Establishing a clear and shared idea of what is to be achieved from the assessment	**Methods and data collection:** Selecting and designing methodologies and collecting data	**Analysis and Interpretation:** Describing and making sense of the results	**Use of results:** Communicating and applying results in the realization of benefits and in the improvement of services
Levels of capability maturity				
5. Optimized: Continuous process improvement is evidence-based and informed by piloting innovative ideas and technologies.	Setting objectives is data driven. Wider trends are considered.	Optimum methods and data collection are used.	The analysis is appropriate, thorough and assists in achieving the objectives/answering the question of interest. There is an analysis of trends. Predicative analysis is employed.	The results drive planning. The use of data and subsequent change is reported.
4. Managed: Detailed measures of the process and product quality are collected. Process and product are understood and controlled.	Objectives are monitored within a quality improvement framework.	There are multiple methods and data collected. Methods and data collection are measured and reviewed.	Data analysis methods are measured and reviewed.	There is a monitoring process to ensure correct processes are followed with audit trails.
3. Defined: Processes are documented, standardized and integrated. All instances use an approved process that meets your organisation's needs.	There is an identified and well documented gap in existing data. There are clear research questions being examined.	Methods and data collection are organized to meet assessment objectives and are well documented. Methods and data collection are valid, reliable and reproducible.	Data analysis methods align with objectives and are well documented. Bias is taken into account. Limitations are documented. Others will get the same interpretations from the data.	There are established and well documented ways of making results available. There is an audit trail of how the results are applied.
2. Repeatable: Basic processes are established to track resourcing, scheduling and function. Can repeat earlier success that are similar.	There is limited documentation of the need to collect data. There is a general understanding of the need to collect data.	Some data is collected on a regular basis. There may be some purpose for collecting the data that aligns with the objectives.	Data analysis methods can be repeated but are not reviewed.	There is some reporting of the results. There is a limited audit trail of how the results are applied.
1. Initial: Processes are ad hoc and occasionally even chaotic. Few processes are defined and success depends on individual effort and heroics	There is no priority of the need for data. Data may be collected on a case by case basis and may lack clear links to over-arching objectives.	Processes are not clear or reproducible. The reason for collecting the data may not necessarily align with the assessment objectives. The data may not be sufficient to answer the question of interest.	Data is selected and analysed without taking into account possible bias and pre-conceptions. Assumptions and weaknesses are not explicit. Data analysis methods and interpretation are dependent on individual expertise which cannot be relied upon.	Results are not reported to appropriate people or acted on. There is no audit trail of how results are applied.

Figure 6. Library assessment capability maturity model generic version.

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Application Level Security in a Public Library

» A Case Study

BY RICHARD THOMCHICK AND TONIA SAN NICOLAS-ROCCA

ABSTRACT

Libraries have historically made great efforts to ensure the confidentiality of patron personally identifiable information (PII), but the rapid, widespread adoption of information technology and the internet have given rise to new privacy and security challenges. Hypertext Transport Protocol Secure (HTTPS) is a form of Hypertext Transport Protocol (HTTP) that enables secure communication over the public internet and provides a deterministic way to guarantee data confidentiality so that attackers cannot eavesdrop on communications. HTTPS has been used to protect sensitive information exchanges, but security exploits such as passive and active attacks have exposed the need to implement HTTPS in a more rigorous and pervasive manner. This report is intended to shed light on the state of HTTPS implementation in libraries, and to suggest ways in which libraries can evaluate and improve application security so that they can better protect the confidentiality of PII about library patrons.

INTRODUCTION

Patron privacy is fundamental to the practice of librarianship in the United States (U.S.). Libraries have historically made great efforts to ensure the confidentiality of personally identifiable information (PII), but the rapid, widespread adoption of information technology and the Internet have given rise to new privacy and security challenges. The USA PATRIOT Act, the rollback of the Federal Communications Commission rules prohibiting internet service providers from selling customer browsing histories without the customer's permission, along with electronic surveillance efforts by the National Security Agency (NSA) and other government agencies, have further intensified privacy concerns about sensitive information that is transmitted over the public internet when patrons interact with electronic library resources through online systems such as an online public access catalog (OPAC).[1]

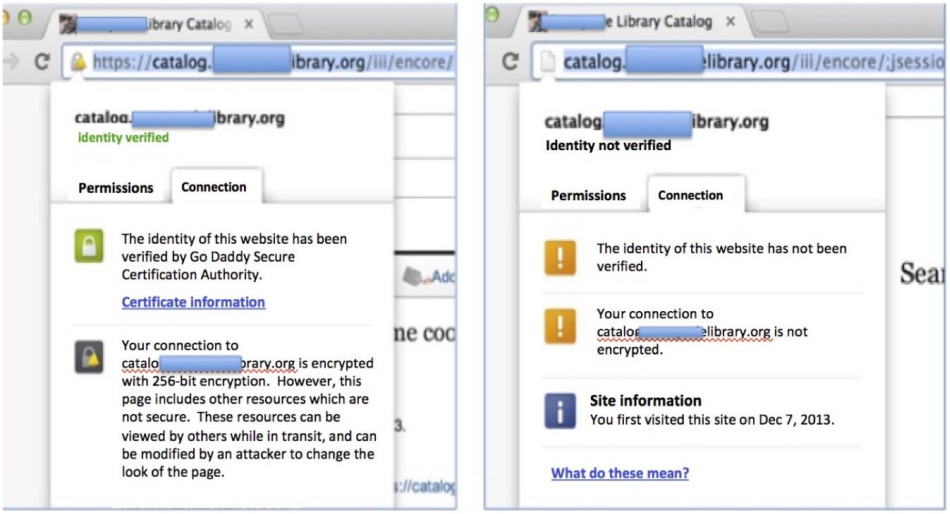

Figure 1. Results of the Library's use of HTTPS.

Hypertext Transport Protocol Secure (HTTPS) is a form of Hypertext Transport Protocol (HTTP) that enables secure communication over the public internet and provides a deterministic way to guarantee data confidentiality so that attackers cannot eavesdrop on communications. HTTPS has been used to protect sensitive information exchanges (i.e., e-commerce transactions, user authentication, etc.). In practice, however, security exploits such as man-in-the-middle attacks have demonstrated the relative ease with which an attacker can transparently eavesdrop on or hijack HTTP traffic by targeting gaps in HTTPS implementation. There is little or no evidence in the literature that libraries are aware of the associated vulnerabilities, threats, or risks, or that researchers have evaluated the use of HTTPS in library web applications. This report is intended to shed light on the state of HTTPS implementation in libraries, and to suggest ways in which libraries can evaluate and improve application security so that they can better protect the confidentiality of PII about library patrons.

The structure of this paper is as follows. First, we review the literature on privacy as it pertains to librarianship and cybersecurity. We then describe the testing and research methods used to evaluate HTTPS implementation. A discussion on the results of the findings is presented. Finally, we explain the limitations and suggest future research directions.

LITERATURE REVIEW

The research begins with a survey of the literature on the topic of confidentiality as

» **Researchers have studied the impact of information technology on patron privacy for several decades. Early research by Harter and Machovec discussed the data privacy challenges arising from the use of automated systems in the library, and the associated ethical considerations for librarians who create, view, modify, and use patron records.**

it pertains to patron privacy; the impact of information technology on libraries; and the use of HTTPS as a security control to protect the confidentiality of patron data when it is transmitted over the public internet. While there is ample literature on the topic of patron privacy, there appears to be a lack of empirical studies that measure the use of HTTPS to protect the privacy of data transmitted to and from patrons when they use library web applications.[2]

The Primal Importance of Patron Privacy

Patron privacy has long been one of the most important principles of the library profession in the U.S. As early as 1939, the Code of Ethics for Librarians explicitly stated, "It is the librarian's obligation to treat as confidential any private information obtained through contact with library patrons."[3] The concept of privacy as applied to personal and circulation data in library records began to appear in the library literature not long after the passage of the U.S. Privacy Act of 1974.[4]

Today, the American Library Association (ALA) regards privacy as "fundamental to the ethics and practice of librarianship," and has formally adopted a policy regarding the confidentiality of personally identifiable information (PII) about library users, which asserts, "confidentiality exists when a library is in possession of personally identifiable information about users and keeps that information private on their behalf."[5] This policy affirms language from the ALA Code of Ethics, and states that "confidentiality extends to information sought or received and resources consulted, borrowed, acquired or transmitted including database search records, reference questions and interviews, circulation records, interlibrary loan records, information about materials downloaded or placed on 'hold' or 'reserve,' and other personally identifiable information about uses of library materials, programs, facilities, or services."[6] With the advent of new technologies used in libraries to support information discovery, more challenges arise to protect patron privacy.[7]

The Impact of Information Technology on Patron Privacy

Researchers have studied the impact of information technology on patron privacy for several decades. Early research by Harter and Machovec discussed the data privacy challenges arising from the use of automated systems in the library, and the associated ethical considerations for librarians who create, view, modify, and use patron records.[8] Fouty addressed issues regarding the privacy of patron data contained in library databases, arguing that online patron records provide more information about individual library users, more quickly, than traditional paper-based files.[9] Agnew and Miller presented a hypothetical case involving the transmission of an obscene email from a library computer, and an ensuing FBI inquiry, as a method of examining privacy issues that arise from patron internet use at the library.[10] In addition, Merry pointed to the potential for violations of patron privacy brought about by tracking of personal information attached to electronic text supplied by publishers.[11]

The consensus from the literature, as articulated by Fifarek, is that technology has given rise to new privacy challenges, and that the adoption of technology in the library has outpaced efforts to maintain patron privacy.[12] This sentiment was echoed and amplified by John Berry, former ALA president, who commented that there are "deeper issues that arise from the impact of converting information to digitized, online formats" and critiqued the library profession for having "not built protections for such fundamental rights as those to free expression, privacy, and freedom."[13] ALA affirmed these findings and validated much of the prevailing research in a report from the Library Information Technology Association, which concluded, "User records have also expanded beyond the standard lists of library cardholders and circulation records as libraries begin to use electronic communication methods such as electronic mail for reference services, and as they provide access to computer, web and printing use."[14]

In more recent years, library systems have made increasing use of network communication protocols such as HTTP and focus of the literature has shifted towards internet technologies in response to the growth of trends such as cloud computing and Web 2.0. Mavodza characterizes the relevance of cloud computing as "unavoidable" and expounds on the ways in which Software-as-a-Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS) and other cloud computing models "bring to the forefront considerations about . . . information security [and] privacy . . . that the librarian has to be knowledgeable about."[15] Levy and Bérard caution that next-generation library systems and web-based solutions are "a breakthrough but need careful scrutiny" of security, privacy, and related issues such as data provenance (i.e., where the information is physically stored, which can potentially affect security and privacy compliance requirements).[16]

Protecting Patron Privacy in the "Library 2.0" Era

"Library 2.0" is an approach to librarianship that emphasizes engagement and multidirectional interaction with library patrons. Although this model is "broader than just online communication and collaboration" and "encompasses both physical and virtual spaces," there can be no doubt that "Library 2.0 is rooted in the global Web 2.0 discussion," and that libraries have made increasing use of Web 2.0 technologies to engage patrons.[17] The Library 2.0 model disrupts many traditional practices for protecting privacy, such as limited tracking of user activity, short-term data retention policies, and anonymous browsing of physical materials. Instead, as Zimmer states, "the norms of Web 2.0 promote

the open sharing of information—often personal information—and the design of many Library 2.0 services capitalize on access to patron information and might require additional tracking, collection, and aggregation of patron activities."[18] As ALA cautioned in their study on privacy and confidentiality, "Libraries that provide materials over websites controlled by the library must determine the appropriate use of any data describing user activity logged or gathered by the web server software."[19] The dilemma facing libraries in the Library 2.0 era, then, is how to appropriately leverage user information while maintaining patron privacy.

Many library systems require users to validate their identity through the use of a username, password, PIN code, or another unique identifier for access to their library circulation records and other personal information.[20] However, several studies suggest the authentication process itself spawns a trail of personally identifiable information about library patrons that must be kept confidential.[21] There is discussion in the literature about the value of using HTTPS and SSL certificates to protect patron privacy and build a high level of trust with users, and general awareness about importance of encrypting communications that involve sensitive information, such as "payment for fines and fees via the OPAC" or when "patrons are required to enter personal details such as addresses, phone numbers, usernames, and/or passwords."[22] However, as Breeding observed, many OPACs and other library automation software products "don't use SSL by default, even when processing these personalization features."[23] These observations call library privacy practices into question, and are concerning since "hackers have identified library ILSs as vulnerable, especially when libraries do not enforce strict system security protocols."[24]

One of the challenges facing libraries is the perception that "a library's basic website and online catalog functions don't need enhanced security."[25] As a matter-of-fact, one of the most common complaints against HTTPS implementation in libraries has been: "we don't serve any sensitive information."[26] These beliefs may be based on the historical practice of using HTTPS selectively to secure "sensitive" information and operations such as user authentication. But in recent years, it has become clear that selective HTTPS implementation is not an adequate defense. The Electronic Frontier Foundation (EFF) cautions, "Some site operators provide only the login page over HTTPS, on the theory that only the user's password is sensitive. These sites' users are vulnerable to passive and active attacks."[27] Passive attacks do not alter systems or data. During a passive attack, a hacker will attempt to listen in on communications over a network. Eavesdropping is an example of a passive attack.[28] Active attacks alter systems or data. During this type of attack, a hacker will attempt to break into a system to make changes to transmitted or stored data, or introduce data into the system. Examples of active attacks include man-in-the-middle, impersonation, and session hijacking.[29]

HTTP Exploits

Web servers typically generate unique session token IDs for authenticated users and transmit them to the browser, where they are cached in the form of cookies. Session hijacking is a type of attack that "compromises the session token by stealing or predicting a valid session token to gain unauthorized access to the web server," often by using a network sniffer to capture a valid session ID that can be used to gain access to the server.[30] Session hijacking is not a new problem, but the release of the Firesheep attack kit in 2010 increased awareness about the inherent insecurity of HTTP and the need for persistent HTTPS.[31] In the wake of Firesheep's release and several major security breaches, Senator Charles Schumer, in a letter to Yahoo!, Twitter, and Amazon, characterized HTTP as a "welcome mat for would-be hackers" and urged the technology industry to implement better security as quickly as possible.[32] These and other events prompted several major site operators, including Google, Facebook, PayPal, and Twitter, to switch from partial to pervasive HTTPS. Today these sites transmit virtually all web application traffic over HTTPS. Security researchers from these companies, as well as from several standards organizations such as Electronic Frontier Foundation (EFF), Internet Engineering Task Force (IETF), and Open Web Application Security Project have shared their experiences and recommendations to help other website operators implement HTTPS effectively.[33] These include encrypting the entire session, avoiding mixed content, configuring cookies correctly, using valid SSL certificates, and enabling HSTS to enforce HTTPS.

TESTING TECHNIQUES USED TO EVALUATE HTTPS IMPLEMENTATION

There is little or no evidence in the literature that libraries are aware of the associated vulnerabilities, threats, or risks, or that researchers have evaluated the use of HTTPS in library web applications. However, there are many methods that libraries can use to evaluate HTTPS and SSL/TLS implementation, including automated software tools and heuristic evaluations. These methods can be combined for deeper analysis.

Automated Software Tools

Among the most widely used automated analysis software tools is SSL Server Test from Qualys SSL Labs. This online service "performs a deep analysis of the configuration of any SSL web server on the public internet" and provides a visual summary as well as detailed information about authentication (certification and certificate chains) and configuration (protocols, key strength, cipher suites, and protocol details).[34] Users can optionally post the results to a central "board" that acts as a clearinghouse for identifying "insecure" and "trusted" sites. Another popular tool is SSLScan, a command-line application that, as the name implies, quickly "queries SSL services, such as HTTPS, in order to determine the ciphers that are supported."[35] However, these tools are limited in that they only report specific types of data and do not provide a holistic view of HTTPS implementation.

Heuristic Evaluations

In addition to automated software tools, librarians can also use heuristic evaluations to manually inspect the gray areas of HTTPS implementation, either to validate the results of automated software or to examine aspects not included in the functionality of these tools. One example is HTTPSNow, a service that lets users report and view information about how websites use HTTPS. HTTPSNow enables this activity by providing heuristics that non-technical audiences can use to derive a relatively accurate assessment of HTTPS deployment on any particular website or application. The project documentation includes descriptions of, and guidance for identifying, HTTP-related vulnerabilities such as use of HTTP during authenticated user sessions, presence of mixed content (instances in which content on a webpage is transmitted via HTTPS while other content elements are transmitted via HTTP), insecure cookie configurations, and use of invalid SSL certificates.

RESEARCH METHODOLOGY

A combination of heuristic and automated methods was used to evaluate HTTPS implementation in a public library web application to determine how many security vulnerabilities exist in the application and assess to the potential privacy risks to the library's patrons.

Research Location

This research project was conducted at a public library in the western US that we will call West Coast Public Library (WCPL). This library was established in 1908 and employs ninety staff and approximately forty volunteers. In addition, it has approximately 91,000 cardholders. As part of its operations, WCPL runs a public-facing website and an integrated library system (ILS) that includes an OPAC with personalization for authenticated users.

Test

To conduct the test, a valid WCPL library patron account was created and used to authenticate one of the authors for access to account information and personalized features of WCPL's OPAC. Next, the Google Chrome web browser was used to visit WCPL's public-facing website. A valid patron name, library card number, and eight-digit PIN number were then used to gain access to online account information. Several tasks were performed to evaluate HTTPS usage. A sample search query for the keyword "recipes" was performed in the OPAC while logged in. The description pages for two of the resources listed in the search engine result page (one printed resource and one electronic resource) were clicked on and viewed. The electronic resource was added to the online account's "book cart" and the book cart page was viewed.

During these activities, HTTPSNow heuristics were applied to individual webpages and to the user session as a whole. The web browser's URL address window was inspected to determine whether some or all pages were transmitted via HTTP or HTTPS. The URL icon in the browser's address bar was clicked on to view a list of the cookies that the application set in the browser. Each cookie was inspected for the text, "Send for: Encrypted connections only," which indicates that the cookie is secure. Individual webpages were checked for the presence of mixed (encrypted and unencrypted) content. Information about individual SSL certificates was inspected to determine their validity and encryption key length. All domain and subdomain names encountered during these activities were documented. The Google Chrome web browser was then used to access the Qualys SSL Server Test tool. Each domain name encountered was submitted. Test results were then examined to determine whether any authentication or configuration flaws exist in WCPL's web applications.

RESULTS AND DISCUSSION

Given the recommendations suggested by several organizations (e.g., EFF, IETF, OWASP), we evaluated WCPL's web application to determine how many security vulnerabilities exist in the application, and assess the potential privacy risks to the library's patrons. The results of tests, as discussed below, suggest that WCPL's web application processes a number of vulnerabilities that could potentially be exploited by attackers and compromise the confidentiality of PII about library patrons. This is not surprising given the lack of research on HTTPS implementation, as well as the general consensus in the literature that technology adoption has outpaced efforts to maintain patron privacy.

Based on the results of these tests, WCPL's website and ILS span across several domains. Some of these domains appear to be operated by WCPL, while others appear to be part of a hosted environment operated by the ILS vendor. Based on this information, it is reasonable to conclude that WCPL's ILS utilizes a "hybrid cloud" model. In addition, random use of HTTPS is observed in the OPAC interface during the testing process. This is discussed in the following sections.

Use of HTTP During Authenticated User Sessions

Library patrons use WCPL's website and OPAC to access and search for books and other material available through the library. Given the results of the tests, WCPL does not use HTTPS pervasively across its entire web application. During the test, we found that WCPL's website is transmitted via HTTP by default. This was after manually entering in the URL with an "https" prefix, which resulted in a redirect to the unencrypted "http" page. We continued to test WCPL's website and OPAC by performing a query using the search bar located on the patron account page. We found that WCPL's OPAC transmits some pages over HTTP and others over HTTPS. For example, when a search query is performed in the search bar located on the patron account page, the search engine results page is sometimes served over HTTPS, and sometimes over HTTP (**see figure 1**). This behavior is not limited to specific pages; rather it appears to be random. This security flaw leaves library patrons vulnerable to passive and active attacks that exploit gaps in HTTPS implementation, which allows an attacker to eavesdrop on and hijack a user-session providing the attacker with access to private information.

Presence of Mixed Content

When a library patron visits a webpage served over HTTPS, the connection with the web server is encrypted, and therefore, safeguarded from attack. If an HTTPS webpage includes content retrieved via HTTP, the webpage is only partially encrypted, leaving the unencrypted content vulnerable to attackers. Analysis of WCPL's website did not reveal any explicit use of mixed content on the public-facing portion of the site. Test results, however, detected unencrypted content sources on some pages of the library's online catalog. This, unfortunately, puts patron privacy at risk as attackers can intercept the HTTP resources when an HTTPS webpage loads content such as an image, iFrame or font over HTTP. This compromises the security of what is perceived to be a secure site by enabling an attacker to exploit an insecure CSS file or JavaScript function, leading to disclosure of sensitive data, malicious website redirect, man-in-the-middle attacks, phishing, and other active attacks.[36]

Insecure Cookie Management

Cookies are small text files, sent from a web server and stored on user computers via web browsers. Cookies can be divided into two categories: Session and Persistent. Persistent cookies are stored on the user's hard drive until they are erased or expire. Unlike persistent cookies, session cookies are stored in memory and erased once the user closes their browser. Provided that computer settings allow for it, cookies are created when a user visits a website. Cookies can be set up such that communication is limited to encrypted communication, and can be used to remember login credentials, previous information entered into forms, such as name, mailing address, email address, and the like. Cookies can also be used to monitor the number of times a user visits a website, the pages a user visits, and the amount of time spent on a webpage.

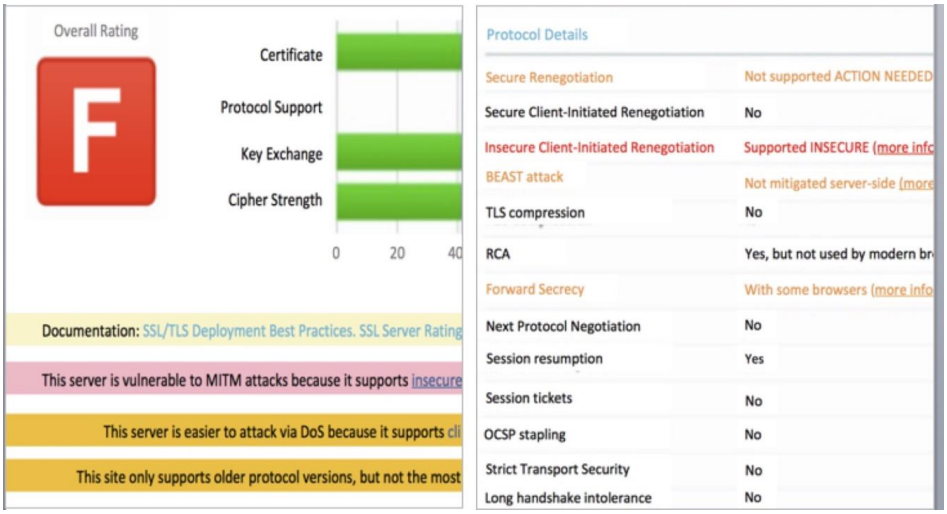

Figure 2. Qualys Scanning Service Results.

The results of the tests suggest that WCPL's cookie policies are inconsistent. We found two types of cookies present. Within one domain, the web application uses a JSESSION cookie that is configured to send for "secure connections only." This indicates that the session ID cookie is encrypted during transmission. Another domain uses an ASP.NET session ID that is configured to send for any connection, which means the session ID could be transmitted in an unencrypted format. Cookies transmitted in an unencrypted format could be intercepted by an attacker in order to eavesdrop on or hijack user sessions. This leaves user privacy vulnerable given the type of information contained within cookies.

FLAWED ENCRYPTION PROTOCOL SUPPORT

Transport Layer Security (TLS) is a protocol designed to provide secure communication over the web. Websites using TLS, therefore, provide a secure communication path between their web servers and web browsers preventing eavesdropping, hijacking, and other active attacks. This study employed the SSL Server Test from Qualys SSL Labs to perform an analysis of WCPL's web applications. Results of the Qualys test **(see figure 2)** indicate that the site does not support TLS 1.2, which means the server may be vulnerable to passive and active attacks, thereby providing hackers with access to data passed between a web server and web browser accessing the server. In addition, the application's server platform supports SSL 2.0, which is insecure because it is subject to a number of passive and active attacks leading to loss of confidentiality, privacy, and integrity.

The vulnerabilities discovered during the testing process may be a result of uncoordinated security. This is concerning because it is a by-product of the cloud computing approach used to operate WCPL's ILS. While libraries may have acclimated to the challenge of coordinating security measures across a distributed application, they now face the added complexity of coordinating security measures with their vendors, who themselves may also utilize additional cloud-based offerings from third parties. As cloud technology adoption increases and cloud-based infrastructures become more complex and distributed, attackers will likely attempt to find and exploit systems with inconsistent or uneven security measures, and libraries will need to work closely with information technology vendors to ensure tight coordination of security measures.

Unencrypted communication using HTTP affects the privacy, security, and integrity of patron data. Passive attacks such as eavesdropping, and active attacks such as hijacking, man-in-the-middle, and phishing can reveal patron login credentials, search history, identity, and other sensitive information that, according to ALA, should be kept private and confidential. Given the results of the testing done in this study, it is clear that WCPL needs to revisit and strengthen their web application security measures by, according to organizations within the security community, using HTTPS pervasively across the entire web application, avoiding mixed content, configuring cookies limited to encrypted communication, using valid SSL certificates, and enabling HSTS to enforce HTTPS. Implementing improvements to HTTPS will mitigate attacks by strengthening the integrity of WCPL's web applications, which in turn, will help protect the privacy and confidentiality of library patrons.

LIMITATIONS AND FUTURE RESEARCH

This research was performed at a public library in the western U.S. Therefore, future research is needed to study the implementation of HTTPS to increase patron privacy at other public libraries, libraries in other parts of the U.S. and in other countries. It would also be valuable to conduct similar research at libraries of different types, including academic, law, medical, and other types of special libraries. SSL Server Test from Qualys SSL Labs and HTTPSNow were used to evaluate the use of HTTPS at WCPL. The use of other evaluation techniques may generate different results.

While a major limitation of this study is the evaluation of a single public library and the implementation of HTTPS to ensure patron privacy, a next phase of research should further investigate the policies in place that are used to safeguard patron privacy. These include security education, training, and awareness programs, as well as access controls. Furthermore, Library 2.0 and cloud computing are fundamental to libraries, but create risks that could impact the ability to keep patron PII safeguarded. As such, future research should evaluate the impact Library 2.0 and cloud computing applications have on maintaining the confidentiality of patron information.

CONCLUSION

The library profession has long been a staunch defender of privacy rights, and the literature reviewed indicates strong awareness and concern about the rapid pace of information technology and its impact on the confidentiality of personally identifiable information about library patrons. Much work has been done to educate librarians and patrons about the risks facing them and the measures they can take to protect themselves. However, the research and experimentation presented in this report strongly suggest that there is a need for WCPL and other libraries to reassess and strengthen their HTTPS implementations. HTTPS is not a panacea for mitigating web application risks, but it can help libraries give patrons the assurance of knowing they take security and privacy seriously, and that reasonable steps are being taken to protect them. Finally, this report concludes

that further research on library application security should be conducted to assess the overall state of application security in public, academic, and special libraries, with the long-term objective of enabling ALA and other professional institutions to develop policies and best practices to guide the secure adoption of Library 2.0 and cloud computing technologies within a socially connected world. ■

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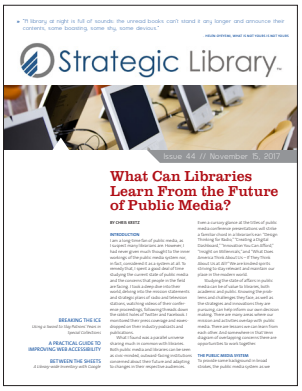

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