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# Library Information Technology

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**Overview – Most Key Library Systems and Technologies Are Available from the Library's Web Site[1]**

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On a recent visit to your local library's web site, perhaps you searched for the latest best seller, new car ratings from Consumer Reports, historic photographs of your neighborhood, your overdue fines, calendar of events, or library news. You likely did not stop to think about where the information you needed was coming from or how it got there. Each of those activities involved one or more technologies implemented in the Web site to make it easier for you to find quality, vetted information. Through its content management system, the library web site integrates the public facing parts of library systems such as the integrated library system, electronic resource management system, openURL resolver, digital library, RSS feeds and social media. These systems and technologies help you and other patrons find content the library has selected for your use.

## Web Content Management System

While it is invisible to the public, the web content management system (WCMS) provides the structure for the public's use of the library's content. The WCMS is software that is used to store, access, manage, and present information for use online. The WCMS has two sets of users, the public who use the web site that is presented by the WCMS and the internal library staff who create and organize the content that appears on the web site. The purpose of the WCMS is to make it easier for library professionals to compose and update content and make it available on the Web, and to make the site more consistent in appearance. Without a WCMS, the librarian would have to write pages in HTML and specify style sheets for formatting these pages. The style sheets and HTML pages would have to be uploaded to a web server before they could be accessed and used by the public. To edit the content, the page would have to first be downloaded and edited and then uploaded again. In the worst case, a simple change that needs to be promulgated throughout the site would result in someone having to edit all of the individual pages on the site. Any site that is more than a few pages can benefit from the use of a WCMS.

These newer WCMS separate presentation from content. The presentation layer consists of templates and style sheets that tell the web server how to display the content. With a WCMS, a technical staff member, usually a Web developer or systems administrator provide the templates and style sheets, or they select and configure them from a set that comes with the system. These templates are associated with specific types of content or specific uses. For example, there may be a template for a home page, a calendar, an announcements page, search results, and an information page. These templates can pull information from a database that contains content and put it in a web page. This content can include text, images, video and structured data. Because templates and content are managed through the system, the content can be reused throughout the site and repurposed on different pages. When a change is made, it is made once to the content in the system and not on each page.

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[1] Draft chapter. Library information technology. In K. Haycock & M. Romaniuk, (Eds.), 2nd Ed. *The Portable MLIS: Insights from the experts*. Santa Barbara, CA: Libraries Unlimited.

The WCMS also makes it easier to reuse content such as banners, navigation bars, headers, footers, search boxes, images, and text blocks throughout the Web site by managing it centrally and keeping them separate from templates and web pages. Because they are maintained centrally, when these elements are changed, the change appears throughout the site. WCMS are especially useful for sites that employ responsive design to optimize the user experience for any device, laptop, desktop, tablet or smartphone which they may be using to access the web site. By manipulating the presentation layer, WCMS can specify when and where content will appear for each of these devices and how to resize the content when needed. Because the templates are also managed centrally, the way the information is presented stays constant regardless of who is entering the content.

Technical staff manage the WCMS and identify which staff members have the ability to add content to specific templates or groups of pages that use those templates. Staff members who enter content are limited in how they can format and change the appearance of content on a given page. If there are many contributors, this keeps the appearance of the site consistent and helps with the library's brand identity. These staff members use a WYSIWYG (what you see is what you get) interface where they enter and format text the way they want it to appear on the web site. It's usually a text box or web form that allows the user to highlight and change the formatting of the text. They can select images and other media from the system to accompany the text if an image is part of the template. They may use a web form to select or upload images for use on a given page. When they save their text or images, they can be stored separately from the template or page where the content will appear. The WCMS creates pages and place them on the web server for users to retrieve. Other pages such as search results are created when a user makes a request to the server.

In the past, most libraries hosted their web sites with the parent institutions that also provided IT support for their other systems. Now many libraries use hosting services for their web sites. These hosting services often provide a WCMS, a handful of templates that can be adapted for use by the library and storage for content. Some popular WCMS offered on hosted systems and used by the wider online community as well as libraries are open source systems like WordPress, Drupal, and Joomla (Pope, 2015). These systems are flexible enough to allow libraries to incorporate search boxes to their catalog or discovery layer. Some libraries use systems developed for libraries such as LibGuides by SpringShare, BiblioCMS by Biblio Commons, or Omeka by omeka.org (Pope, 2015), the home page of their ILS as content management systems. Although they may not be as customizable as a WCMS, these systems offer many of the same services as a WCMS - a separation of presentation and content, templated pages that can be configured for local needs, and a way to update common elements across the entire site with a few clicks.

WCMS are changing. As libraries rely more on their web sites to communicate with their constituencies and have more online visitors than visitors to their physical spaces, they will likely see their content management activities change in the same way that commercial web sites are changing with an emphasis on systems that can manage the user experience as well as the content. Patrons want sites that can respond to the devices they use and their location and other context information provided by their devices (Spring, 2016). As WCMS develop, they will move beyond

support for responsive design to offer support for location and other context services that access patron information and preferences stored on their devices. These services will become more integrated with the systems that provide information such as catalogs and social media feeds and content such as discovery services, digital libraries, and e-content.

**From Integrated Library System to Library Service Platform**

For four decades, integrated library systems (ILS) served as the core automation system that facilitated libraries in acquiring, organizing, and managing their resources, as well as connecting library patrons with library collections through the library's online public access catalog (OPAC); as a result, the ILS defined a library's workflows, business process, and operation. Comparable to a retail point-of-sale system in a store, a well-managed and configured ILS enabled libraries and library staff to offer the most relevant resources and satisfactory services to their patrons and contributed to the success of library services.

Over the years, ILS has continued to evolve and expand in response to the increasing complexity in the information sphere. In the digital age, libraries have transitioned gradually from print-centric holdings to hybrid collections with a diverse range of print, electronic, and multimedia content. Libraries' business operations have transformed from location-based services attached to a physical library or a network of libraries to a mix of online and onsite services. Consequently, a newer generation of ILS products has evolved to accommodate the proliferation of electronic resources, to facilitate discovery and seamless access to e-content, and to support expanding demands from the online user community. This new generation library management system, called Library Services Platform or LSP, differentiates from the traditional ILS in several areas:

**Cloud mobile computing.** Library Services Platforms leverage the latest computing architecture and cloud computing technology in which the hardware, software, and associated services are no longer housed locally or managed by library IT professionals. Instead, LSPs are hosted at a vendor's secured facility and managed by the vendor. In the cloud environment, LSPs are usually far away from library customers, so a reliable network connection with adequate bandwidth is prerequisite. Additionally, the connection should be encrypted to avoid loss of personal and other sensitive data traversing between libraries and the LSPs and to comply with federal and state regulations.

**Multitenancy.** LSPs take advantage of a new software architecture in which a single instance of software application, i.e. a common copy of a LSP software, is shared among multiple library customers. Each library customer is an individual tenant of this communal system and has certain flexibility of customizing the applications, such as circulation policies. However, they cannot modify the application codes. Multitenancy creates a substantial efficiency as only a single copy of software needs to be managed and upgraded by vendors' IT professionals. As all customers are running on the identical hardware, operating system, and version of software with less divergent configurations, multitenancy further afford vendors a setting for more agile product development and more frequent software updates, enhancements, and patches.

**Managed service.** In the hosted environment, LSP vendors are responsible for the management and delivery of software and applications used by their customers. The vendors also

take care of the routine system administration tasks, such as performance and network monitoring, resource allocation, data backup, hardware upgrade, and security management. In the SaaS (software-as-a-service) arrangement, libraries outsource system administration and software upgrade to vendors, instead of performing it with in-house staff. In a SaaS model, libraries usually sign a multiyear contract with the vendor and pay annual subscription costs. This allows libraries to shift the financial burden from upfront capital expenses associated with hardware and software licensing to ongoing operating expenses. Libraries can also allocate valuable IT professionals and resources related to system administration to more business-centric areas and tasks instead of systems maintenance.

**Discovery service.** Another major enhancement of LSP is the upgrade from the old-fashioned OPAC to a more modern, simple, and intuitive search interface commonly called a "discovery" service. Featuring a simple search box, the discovery service allows patrons to perform a keyword search of the full spectrum of content, from journal articles and e-books to open access publications carried by the library. The search results are ranked by relevancy, and patrons can further filter their search results by using pre-defined facets, such as availability, subject, type of publications, language, and date of publication. After identifying relevant citations, patrons can directly access the full text of the source through a link resolver or other reference linking tools, such as Digital Object Identifier (DOI), a unique identifier with persistent link for online content. Consequently, the discovery to delivery process is streamlined. In the back end, the discovery service aggregates all metadata from a library's siloed databases and collections into an all-inclusive central index that patrons can search. The discovery service also relies on a knowledge base to track the holdings of library subscribed e-resources, their web addresses, subscription status, and licensing information, such as number of concurrent users and access rights to facilitate access to the content.

**Web-based platform.** As the Web has become the platform for doing business in the online environment, the web browser, instead of desktop applications, is now the sole interface for library staff to access and interact with LSP. Staff now perform all their tasks through a web browser regardless of the operating system and hardware of their devices. Such flexibility significantly alters the way staff serve patrons and manage resources. With a web-enabled mobile device, library staff can now be deployed in the field and embedded in the user community instead of waiting for patrons to come to the library. Some exciting cases of innovative practices in a mobile cloud environment include registering new patrons at a community event such as a 10K run or farmer's market; renewing checked out items at faculty offices; and performing inventory, record maintenance, or weeding directly in the book stacks.

**More open and interoperable.** The Library system is by no means a closed system. It interacts and exchanges information with other enterprise systems within the organization. At academic libraries, patron data usually derives from the institution's student information system and human resources system, for example. Invoices of library material purchases is passed from the library system to the institution's financial system for issuing payments. The Library system also interacts directly with a vendor's system in placing orders and receiving bibliographic, order, and invoice records. LSPs, built on Web service oriented architecture, support further interoperability and integration with other enterprise resource planning systems. Access to metadata on LSPs are also available through application programing interface (API). An API is

an interface through which information and data are exchanged between two trusted systems. With APIs, patrons can access information that resides on multiple systems seamlessly. Library operations previously performed manually by staff members can be automated with higher efficiency and productivity.

No single library system or vendor can deliver all the functionality that meet the complex library operation. LSPs adopt the latest computing technologies and architectures and redefine library workflows to efficiently manage library content holistically, regardless of its format and geographical location. Unlike the traditional ILS with a focus on library collections and library staff operations, LSPs are designed to fulfill patron needs and offer easy discovery and access to library content with a unified resource management approach. They aim to provide a user-friendly, holistic system to bridge our patrons with the diverse library resources in an efficient manner.

**Digital Libraries and Digital Asset Management**

The term "digital library" has been defined and redefined by a variety of authors since the 1980s. Early definitions focus on content and services of the traditional library being made available in electronic formats. As the Internet developed and collections could be made available to anyone with a network connection, definitions shifted their focus to the societal role of libraries fostering the free exchange of information (Calhoun, 2014). Digital libraries make digital content accessible and discoverable in addition to managing and preserving that content.

Undergirding every digital library is an information system that stores files and metadata (information about those files). Files and metadata together are referred to as "digital objects." Outside of the library context, these systems are called digital asset management systems. The "digital objects" are the "digital assets." The library profession has designed and built several digital library management systems that are used almost exclusively by libraries and similar cultural heritage institutions. Libraries rarely use digital asset management systems created for commercial use. The primary reason that libraries develop their own systems is that the profession has created and adopted a set of standards that it sees as necessary for describing, discovering, and preserving digital objects. These standards often have a basis in the physical world with physical collections since much of what libraries have digitized are traditional library content such as books, magazines, manuscripts, photographs, drawings and maps. Systems developed for commercial use employ different standards or require customization in order for libraries to use them.

These digital library systems are often based on a reference or conceptual model that examines the processes of creating, storing, managing, accessing, and preserving digital content. The three most often referenced models are the Open Archival Information Systems (OAIS) Reference Model, the DELOS[2] (a Network of Excellence for Digital Libraries) Reference Model, and the 5 Ss conceptual model. The OAIS Reference Model was developed by NASA to "assist … managing and ensuring the long term preservation of, and access to, digital information" (Sawyer, 2000). The OAIS Reference Model is notable because it describes digital library content in terms of "information objects" and "archival information packets" (Sawyer, 2000). This reference model describes processes such as ingest, administration, and preservation, and their

[2] DELOS is not an acronym, the association has been called DELOS since its beginning.

relationship to each other. For the OAIS, preservation is the most important function of the system (Sawyer, 2000).

The DELOS Reference Model contains a manifesto that describes and defines "cornerstone concepts" for understanding digital libraries and their functionality in the hopes of spurring innovation, research, interoperation of systems. The document is detailed in showing how various parts of a digital library management system operates (Candela et al., 2007). It covers many of the concepts found in the OAIS Model and the 5Ss.

Finally, the 5 Ss is a conceptual model proposed by a group of computer scientists for a minimal digital library. The 5 Ss are streams, structures, scenarios, spaces, societies (Fox, Gonçalves, & Shen, 2012). Streams refers to the movement of information through the digital library. Structures are ways of organizing information to move it through the digital library. Scenarios are business processes that govern how the information flows. Spaces are ways that users interact with the system such as a web page or other display. Societies are collections of entitites that interact with the system. They can be human or computer entities. A group of computers that interacts with a system and retrieves information from it would be a society, and a university community would also be a society. (Fox, Gonçalves, & Shen, 2012). Unlike the OAIS and DELOS models, the 5 Ss does not discuss specific processes, but provides a flexible framework that can be adapted. The 5Ss model can be used to discuss any digital library and does not give preference to any process or function such as preservation.

The design of digital library management systems is influenced by the size and number of files accessed as well as the growth rate of the collection. The ability to handle more, ever large files is called scalability. Scalable systems handle their increasing load without slowing down or failing. They are designed to accommodate the growth of the system and its use. In addition to scalability systems are designed to be extensible, allowing for the system to change and develop over time and interoperable, capable of integrating with other systems.

The communities for which a digital library is built influence the structure and functionality of the system. Cultural heritage institutions supporting K-12 education have different requirements than scientists accessing large data sets. Researchers needing copies of the latest journal articles have different expectations than a digital humanist who is text mining the works of Jane Austen. Cultural heritage institutions may have more visual media including photographs, drawings, and maps and want to feature these resources. A scientific research center may have more data sets and may want to make these available with the research that has been published using the data.

The stakeholders who build the system along with the intended audience shape the functionality of the digital library. If a collection is visual or human readable, viewer applications are needed for digital objects. If a collection houses data, then tools to extract, analyze and visualize data may be needed. In the current environment, a digital library needs to have a community of users that find its content compelling and important or it will not be used.

**E-Resources and E-Resource Management**

One could argue that large collections of electronic journals and e-books are digital libraries. In the 1990s collections of online journals emerged as an alternative to their print counterparts. It took a bit longer for digital books to be accepted by the general public and libraries and become a significant presence in their collections. In the last few years, e-book sales have seen explosive growth with the popularity of tablets, e-readers, and other mobile devices, as well as the acceptance of e-reading by patrons. Libraries, especially academic libraries, now spend a large portion of their materials budget on e-content in response to changing user preference and behavior. Meanwhile, the legacy integrated library system and the traditional metadata standards that were designed to manage print holdings are inadequate to handle the unique features and complexities of e-resources. Consequently, in early 2000s, library system vendors and libraries developed a stand-alone system, now known as electronic resources management system (ERMS), dedicated to manage and facilitate the patron's access to the library's ever-growing e-resources.

ERMS defines and supports the workflows and business processes associated with e-resource management throughout the life cycle of electronic resources. Beginning with the discovery of a new resource, the e-resources life cycle encompasses a set of interrelated and recurring stages, including investigation and trial of the resource; acquisition, price negotiation, and licensing of the resource; activation and provision of access; maintenance and patron support; statistics tracking and usage review; and renewal.

Knowledge base (KB) is the centerpiece of an ERMS. First and foremost, KB is a repository of all of the e-resources a library subscribes to. Each record contains publication metadata, content coverage dates, cost, Internet address, licensing agreement, and accessible rights. Due to the fluid nature of Internet resources, ERMS vendors constantly incorporate changes from publishers and update the metadata in the knowledge base to ensure the accuracy of resource addresses and content coverages. Knowledge base also functions as the engine that powers the library's e-resource portals, typically consisting of searchable A to Z lists for e-books, e-journals or databases. A link resolver is another key component of ERMS and relies on the holdings data in knowledge base. Acting as a traffic director, the link resolver connects patrons from an individual citation to its full text, its catalog record, or interlibrary loan request form when full text is not available.

A full-functional ERMS also offers quantitative and qualitative analytics and reports that provide the library a holistic view of collection usage, content overlap, collection comparison with peers, and cost per usage per title or collection. Aggregating and normalizing usage data from diverse sources is made possible with the COUNTER (Counting Online Usage of Networked Electronic Resources) standard that clearly defines each data element and is supported by major vendors, publishers, and libraries. To further streamline the data integration process, the library and publisher community further developed the SUSHI (Standardized Usage Statistics Harvesting Initiative) protocol that allows ERMS to automatically harvest usage data from vendor's systems.

**Social Media**

The panoply of e-resources available on the Web makes it easy for patrons to access the library from anywhere at any time of the day or night. Many libraries find that they have more online interaction with their patrons than they have ever had with them in the library. As patrons interact more with the online presence of the library than they do the physical library, libraries want to engage with these remote patrons and find ways to keep them engaged with the library. To do this, libraries employ social media to publicize their services and develop communities that support them. The most commonly used social media tools (Greenwood, Perrin, & Duggan, 2016) that are used by libraries are YouTube, Vimeo, Facebook, Twitter, Instagram, Tumblr and Pinterest. SnapChat is less frequently used, but offers promise because of its use by teens and young adults (Greenwood, Perrin, & Duggan, 2016).

**YouTube and Vimeo.** YouTube and Vimeo are services where users post videos. Libraries can get "channels" on YouTube and place a series of videos there. The American Library Association has such a channel that it uses for news, tutorials, presentations, webinar recordings and conference sessions (https://www.youtube.com/user/AmLibraryAssociation). Other library uses are videos of special events such as author talks and seminars held at the library. Videos on YouTube and Vimeo can be easily incorporated into a library's web site or shared through other social media platforms such as Facebook and Twitter.

**Facebook.** Facebook pages allow libraries to share information about the library with patrons that "like" and "follow" them. Postings can include information about events at the library, new services and resources, and other news involving the library. Facebook allows for both short posts such as links to helpful websites and longer posting similar to blogs. Libraries can post photographs and videos of past events for their followers to "like." Facebook, once popular with teens is now very popular with older adults (Greenwood, Perrin, & Duggan, 2016). The Dallas Public Library has an active Facebook page that it uses to promote the library and library events.

**Instagram.** Whereas Facebook is popular with older adults, Instagram - which gained popularity because it made sharing photos easy, is more popular with teens and young adults (Greenwood et al., 2016). Instagram allows users to take photos, apply filters, and post them quickly for sharing. Instagram can be used by libraries to share photographs and videos of events with followers. Some libraries, like the Library of Congress use Instagram to highlight items in their collections. For libraries with photograph and other visually rich collections, Instagram offers a good way to publicize collections by sharing images with followers. Tumblr is similar to Instagram in that it allows users to share photos. Instagram allows users to take and share their own photos. Tumblr allows user to share others photos as well and curate them in collections. UCLA Special Collections uses Tumblr to highlight photographs and other rare materials in its collections. *My Daguerreotype Boyfriend* is an example of curating historical photos around a given format and theme.

**Twitter.** For years, Twitter was the haiku of social media (Green, 2013). Limited to 140 characters, users of Twitter had to be concise. That changed in 2016 when Twitter announced it would allow longer tweets and the addition of photos and video clips. Libraries have mostly used Twitter to promote events, services, and collections. The difficulty with Twitter is that it requires an almost constant flow of information to keep followers engaged. For someone to have a

successful Twitter presence they have to tweet several times a day. This is a significant commitment for most libraries. Libraries have to post about themselves and share information that others have tweeted to be relevant. The Santa Monic Public Library and Los Angeles Public Library have active twitter feeds which they use to promote library events and advocate for reading and literacy.

**Pinterest.** While Instagram and Twitter allow users to post and share information about themselves, the focus of Pinterest, like Tumblr is curation. With Pinterest users create boards around a given topic that are shared with others. In Pinterest, users curate collections of images. They may create the images themselves or find images elsewhere and re-share them. Libraries use Pinterest boards in a variety of ways. Some libraries, such as the USC Digital Library use Pinterest to highlight visual content in their digital collections. Other libraries such as the Toronto Public Library use Pinterest boards for a variety of purposes including providing photographs of a library building's unique architecture, highlighting events at the library, and providing photographs of cover art from story hour books. The Birmingham Public Library uses Pinterest boards to provide a sampling of library crafts, study tips, and Hunger Games trivia in addition to promoting collections and events. In Pinterest, librarians can use social media to select and curate content on boards similar to the way they might create a display for their library or assemble a collection.

**SnapChat** allows users to create stories that are sets of photos and video clips that users share with each other. Stories can disappear after someone views them. SnapChat is popular with teens and young adults because it provides geotags and filters that make the photos in the story more interesting. Libraries can use SnapChat stories in the same way they would use Twitter or Instagram to promote events or share events in progress.

Libraries often develop a strategy for using social media. This strategy will draw from the overall mission and goals of the library and take into account the staff's facility with and use of social media outside work. A library may find that patrons are better at promoting the library with social media. For example, teens use social media to share information within their social group and actively use it to complete school projects (Agosta, Purcell, Maggee, & Forte, 2015). Providing buttons that make it easy to share books and articles with friends can assist them. Providing hashtags for events and geotags for the library allows them to identify the library events they attend. If libraries want to encourage their patrons, especially teens and young adults to engage with the library, they can start by creating social media friendly systems like catalogs and online content with "share" buttons and later establish accounts on the social media sites that will help them meet their goals. Finally libraries can pull the posts from their social media accounts and posts that mention them into their library web pages so that everyone can read them.

## Conclusion

Digital technology has transformed library operations and services. The Web has become the platform for delivering a large part of library content and service, while the boundary among various library resources and systems are less discernable. As libraries move their services to the cloud, it becomes easier for them to gather and share data about their visitors and provide services based on group behavior. While commercial sites embrace these technologies, libraries will

continue to grapple with the ethical conflict between the desire to provide these services and respect the privacy of visitors to their sites. With insightful strategies and adroit stewardship, a powerful platform and distribution channel will drive innovative practice, cultivate partnership with key stakeholders, and increase library's digital footprints while protecting patrons' privacy. The Web-centric library ecosystem will afford better and faster responses to patron's needs, embrace change to expand beyond the physical collections and site-based services.

References

Agosto, D. E., Purcell, M., Magee, R. M., & Forte, A. (2015). Teens, libraries, and social media: Myths and reality. *Public Library Quarterly*, *34*(4), 318-327. doi:10.1080/01616846.2015.1106892

Birmingham Public Library. *Birmingham Public Library Pinterest Board*. Retrieved from: https://www.pinterest.com/bplonline/

Calhoun, K. (2014). *Exploring digital libraries: Foundations, practice, prospects*. Chicago: Neal-Schuman.

Candela, L., Castelli, D., Ferro, N., Ioannidis, Y., Koutrika, G., Meghini, C., … Schuldt, H. (2007). *The DELOS Digital Library Reference Model: Foundations for digital libraries (Version 0.96).* DELOS Network of Excellence on Digital Libraries. Retrieved from http://delosw.isti.cnr.it/files/pdf/ReferenceModel/DELOS_DLReferenceModel_096.pdf

Dallas Public Library. *Dallas Public Libraries, New Things Happening Every Day*. https://www.facebook.com/dallaslibrary/

Facebook. https://www.facebook.com/

Fox, E. A., Gonçalves, M. A., & Shen, R. (2012). Theoretical foundations for digital libraries: The 5S (societies, scenarios, spaces, structures, streams) approach. *Synthesis Lectures on Information Concepts, Retrieval, and Services*, *4*(2), 1–180. doi.org:10.2200/S00434ED1V01Y201207ICR022

Green, E. (20 June 2013). Twitter is the new haiku. *The Atlantic.* https://www.theatlantic.com/technology/archive/2013/06/twitter-is-the-new-haiku/277405/

Greenwood, S., Perrin, A., and Duggan, M. (2016). Social Media Update 2016. Pew Research Center. Retrieved from: http://assets.pewresearch.org/wp-content/uploads/sites/14/2016/11/10132827/PI_2016.11.11_Social-Media-Update_FINAL.pdf

Instagram. http://instagram.com

Library of Congress. *Library of Congress Instagram*. https://www.instagram.com/librarycongress

Los Angeles Public Library. *L.A. Public Library Twitter*. https://twitter.com/LAPublicLibrary

*My Daguerreotype Boyfriend*. http://mydaguerreotypeboyfriend.tumblr.com

Pinterest. https://pinterest.com

Pope, E. (6 April 2015). Top content management systems for libraries. *Tech Soup for Libraries*. Retrieved from http://www.techsoupforlibraries.org/blog/content-management-systems-for-library-websites

Spring, R. (February 1, 2016). The state of web content management. *EContent*. Retrieved from http://www.econtentmag.com/Articles/Editorial/Feature/The-State-of-Web-Content-Management-108657.htm

Santa Monica Public Library. *Santa Monica Library Twitter*. https://twitter.com/SantaMonicaLibr

Sawyer, D. (2000). The Open Archival Information System and the NSSDC. Retrieved from http://nssdc.gsfc.nasa.gov/nssdc_news/dec00/oais.html

SnapChat. https://snapchat.com

Toronto Public Library. *Toronto Public Library Pinterest Board*. https://www.pinterest.com/torontolibrary

Tumblr. https://tumblr.com

Twitter. https://twitter.com

University of California Los Angeles. *UCLA Libraries Special Collections Tumblr*. http://uclalibraryspecialcollections.tumblr.com

University of Southern California Libraries. *USC Digital Library Pinterest Board*. https://www.pinterest.com/uscdiglib/

Vimeo. https://www.vimeo.com

YouTube. https://www.youtube.com

**Further Readings**

Askey, D., and Hinchliffe, L.J. (18 May 2017). Finding a way from the margins to the middle. *Issue Brief*. Ithaka S&R. https://doi.org/10.18665/sr.303501

Breeding, M. (2 May 2017). Library systems report 2017: Competing visions for technology, openness, and workflow. *American Libraries*. Retrieved from https://americanlibrariesmagazine.org/2017/05/01/library-systems-report-2017

Burke, J. J. (2016). *Neal-Schuman library technology companion: a basic guide for library staff* (5th ed.). Chicago: Neal-Schuman

Calhoun, K. (2014). *Exploring digital libraries: Foundations, practice, prospects*. Chicago: Neal-Schuman.

Pope, E. (6 April 2015). Top content management systems for libraries. *Tech Soup for Libraries*. Retrieved from http://www.techsoupforlibraries.org/blog/content-management-systems-for-library-websites