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Towards an Open Source-First Praxis in Libraries

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ABSTRACT

In terms of utility and technical quality, open-source software solutions have become a common option for many libraries. As barriers to adoption have been reduced and systems such as FOLIO appear poised to change the landscape of LIS technology, it is worth examining how the use of open source can support the normative core values of librarianship and to outline a strategy for critical engagement with the technology that is beneficial to patrons and libraries. Such a strategy will require further codification, institutionalization, and investigation of open source at many levels.

INTRODUCTION

Open-source software has continued to gain popularity among libraries in the past decade. It has moved from the periphery to become a major competitor with some of the most established software in the library technology sector, but implementation has been uneven and is still represented in only a small percentage of libraries. Among those that have adopted open-source systems, the language used to describe the switch is often related more to pragmatism than normative concerns.[1] As acceptance of open source as a legitimate technical alternative to proprietary systems has gained traction, some may be interested in reevaluating the heretofore utilitarian drivers of open source adoption and ask how it can bolster the values and ideals of librarianship.

The open-source movement, while sharing some of the same civic ideals as librarianship, is not as motivationally coherent. Some corners of the movement are motivated by industrial or market concerns. Therefore, as open source emerges as a common option for many libraries, it is in the interests of the profession to establish, early on, the terms on which it will critically engage with open source.

As software has matured and third-party support has expanded, the technical barriers to adopting open source have greatly diminished and, especially when viewed through the lens of critical librarianship, the reasons to choose open source are more pertinent than ever. As noted, for many libraries, the conversation has up until now focused, and not entirely unjustly so, largely on utility and cost-effectiveness (an unfortunately myopic view of open-source software that stops at "potential utility" and highlights "ease of installation") while ignoring how open source can support the values of librarianship and the library's mission. While questions of support personnel and budget are still relevant, advances in the past decade mean that they no longer must represent the entirety of the discussion of open source in libraries. Libraries now have the opportunity to look at what is arguably the more fundamental reason they should adopt an open-source-first praxis, an approach where closed-source proprietary systems should only be considered as a last resort.

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Libraries have a duty to their patrons. In order to serve them well, the profession has adopted a set of associated core values such as *service*, *privacy*, *equity of access*, *stewardship,* and *intellectual freedom*. The use of closed-source technology presents complicated ethical questions related to, among other things, information security, privacy, and transparency. Fortunately, the LIS and open-source communities share many of the same core values and can support each other in addressing the deficiencies and transgressions of proprietary software.

Because of the lowered barriers to entry and because the values of librarianship and the open-source community complement each other so well, open-source technologies present libraries with both a pragmatic solution to better serve patrons and a solution that aligns with the values of the profession. The justification arguments for libraries to use open source represent the intersection of pragmatic, utilitarian, and moral nonutilitarian stances.

However, if open source is to reinforce the mission of libraries, it must be viewed through a critical lens. Librarians must ask whether efforts to develop and introduce systems that are fundamental to their missions are best led by private enterprise or by libraries themselves.

The motivation of this article is to review the current state of open-source technology in LIS, address common concerns, especially regarding the principles of librarianship, and critically evaluate developments in the field. The use of open-source technology presents a pragmatic opportunity for libraries, but if not approached thoughtfully, it could potentially result in a compromise of professional ethics like what has already occurred more generally with the commodification of the information profession.[2]

THEORETICAL NOTE

Broadly speaking, this article is informed by a critical theoretical approach. "Critical theories have been applied to LIS under a general umbrella of 'critical librarianship,' which takes an explicitly political approach to information work, seeking to promote ethical practices which support the ethical creation and communication of scholarly knowledge with a focus on implications for social justice."[3] Moreover, this article advocates a praxis in line with that defined by John Budd: "action that carries social and ethical implications and is not reducible to technical performance of tasks."[4]

More specifically, much is owed to Bergquist et al.'s application of Boltanski's and Thévenot's justification framework to the development of the free and open-source software movement.[5] It is further applied here to the use of open source in LIS. Put briefly, the framework presents a typology that describes how actors in various settings justify means and initiatives.[6] The typology is composed of six justification logics: *inspirational*, related to seeking an authenticity in life via artistry; *domestic*, related to maintenance of a traditional status quo; *popular*, in which personal aggrandizement is prioritized; *civic*, where the common good is paramount; *market*, where commerce is the focus; and *industrial*, where qualities such as efficiency, productivity, and functionality are used to justify actions (see table 1). This framework is particularly useful in a discussion of praxis since the nuances of motivation and justification can be more easily clarified.

After briefly providing context for open source, its current use in libraries, and the core values associated with librarianship, I use this framework to inform my discussion of open source and librarianship.

Table 1. Boltanski's and Thévenot's justification typology

Justification logic	Defined by
Inspirational	Authenticity in life via artistry
Domestic	Maintenance of a traditional status quo
Popular	Personal aggrandizement
Civic	Prioritization of common good
Market	Prioritization of commerce
Industrial	Efficiency, productivity, and functionality

OPEN-SOURCE TECHNOLOGY

What is discussed here as open source is known as open-source software (OSS), Free and Open-Source Software (FOSS) or Free Libre Open-Source Software (FLOSS or F/LOSS); each variation representing conflicting philosophies within the movement that range from communal development for the public good to profit-maximizing neoliberal business models. In the interest of simplicity and brevity, and since it is the most commonly used term within LIS literature, the terms *open source* and *open-source software* are used throughout this discussion.

The concepts underpinning open source were first introduced in the 1980s as private firms began restricting access to software (specifically to its source code) under the auspices of intellectual property rights. It was at this time that the GNU General Public License (GPL) was written by Richard Stallman, the founder of the Free Software Foundation. It stipulated that items licensed under the GPL were subject to the "four essential freedoms" to run, study, share, and modify the information therein, and that any derivative works should be subject to those freedoms as well. This latter concept, related to derivative works, is known as "copyleft." According to Ettlinger, "Many open-source and free software developers have deliberately subverted the idea of intellectual-property rights and, in the process, created a rich common to which all could contribute, according to their abilities, and from which all could benefit, according to their needs; where innovations could be shared for free."[7]

Following this initial period of idealistically motivated development came another decisive moment for open source when Linus Torvalds, while working on Linux in the early 1990s, discovered that by releasing the code as he went and making it easy for others to review and contribute to, the quality of the software was much higher than if one person or team were working on it in isolation. Torvalds estimated that he only coded 2% of the project himself; the remainder came from contributors.[8] Soon industry found it difficult to ignore a development model that offered such a cost-effective approach to making high-quality software.

Later, other licenses, referred to as "permissive," were introduced that did not require that the derivative works observe the same freedoms as the original. As a result, they were seen as less hostile to intellectual property and private enterprise. While a compromise of the original principles of the free software movement, this change was seen as a major turning point for open source, as it resulted in a significant growth in the amount of, and use of, open-source software. As the foundational freedoms were de-emphasized, we see the term "open source" instead of "free software" used more often from this point forward.

Today open source is a common foundation for, or component of, proprietary software, and firms like Google and Microsoft are major contributors to the development of open source. Likewise, in the LIS sector, it is not uncommon for open-source technologies to represent significant components of closed-source systems.

Within these developments of the open-source movement, there can be observed three major currents of importance for the present argument, or put another way, using the concepts of justification borrowed from Luc Boltanski and Laurent Thevénot, the three justification regimes employed for the use of open source could be described as civic, industrial, and market logic.[9] During its early stages, use of open-source software was dominated by a civic logic based "on principles and rules defining free software as a common good" as codified in the "four essential freedoms" of the GNU GPL license, and later by an industrial logic that prioritized quality and efficiency[10] as exemplified by Torvalds's work on the Linux kernel. Later still we see market justification employed with the introduction of permissive licenses.

This will be addressed further below, but it is worth noting here that while there are additional logics at play when justifying the use of open source in general, it is the interaction of civic, industrial, and market logic that are especially relevant here, because they are mirrored in the justification for use of open source within librarianship.

Open-Source Trends in Librarianship

> Because we share so many of the values of the OSS community, we should feel an obligation to promote open source in the library community.[11]

At this point it is worth briefly surveying the four major pieces of open-source software used in libraries (see table 2), all of which are library systems. The discussion of open source in libraries is often focused on integrated library systems (ILSs), because they represent the single largest mission-critical system that most libraries work with on a daily basis and they affect almost every operation of the library. The discussion here tends to focus on ILSs as well, but that should not suggest that there are not other powerful open-source technologies available to librarians. There are notable examples in discovery systems (Aspen Discovery, Blacklight, VuFind), institutional repositories (EPrints, DSpace, Islandora, Omeka, OPUS 4, Samvera Hyrax), content management systems (Drupal, SubjectsPlus, WordPress, etc.), wikis (BookStack, MediaWiki, etc.), and analytics (Matomo, Umami). There are even robust open-source platforms for networking and communication such as the ascendant Mastodon microblogging platform.

Koha

One of the first and, to date, most actively developed pieces of open-source LIS software is the Koha ILS.[12] It was launched in 2000 in New Zealand for a group of three libraries, and it is licensed under the GNU GPL license. It has a very active global community and many private firms that offer support. Traditionally popular with small to medium-sized libraries, Koha has gained traction with larger academic and public libraries in recent years.

OPALS

In 2001, six New York State School Library Systems came together to create what would become OPALS (**OP**en-source **A**utomated **L**ibrary **S**ystem). Today OPALS is developed by a single company, Media Flex, and used primarily in school libraries. "OPALS support is provided through districts, other service centers, or directly through Media Flex. Although an open-source software, development for OPALS is performed primarily by Media Flex."[13] While open source and licensed

with GNU GPL, OPALS does not appear to take advantage of a collaborative development model as its source code is only available by request from Media Flex.[14]

Evergreen

In 2004, the Georgia Public Library System began development of the Evergreen ILS for its large consortium of public libraries, and in 2006 Evergreen was launched with a GNU GPL license. Afterwards a nonprofit corporation, Equinox, was formed to promote, develop, and support the system. Because Evergreen was originally developed with large consortia or library systems in mind, it offers possibilities of scale, but requires significant resources, which may have heretofore slowed it growth.

FOLIO

FOLIO was introduced in 2016 under the Apache 2.0 license which, unlike the GNU GPL, does not require that derivative works carry similar licenses as the source. This means that in the future, proprietary software can be built with FOLIO as a base, much like the web server software of the license's namesake, Apache, is used as the base for much of the internet today. Despite relatively low levels of current adoption (see table 3), FOLIO should not be underestimated. FOLIO is being heavily promoted and has found several high-profile early adopters, especially from the now abandoned Kuali OLE project. Notably, in mid-2022, the Library of Congress announced its intent to migrate to, and support, FOLIO.[15]

The FOLIO project is currently developed under the auspices of a single-member limited liability company by the same name, nested within the Open Library Foundation (OLF), and is supported by many large libraries and library consortia, but it was EBSCO that, in 2015, began exploring the possibility of creating an open-source project and has since significantly funded, promoted, and steered the project.[16] EBSCO, as the only "enabling partner," has stated that it "does not expect to exert direct control" beyond "its basic expectations of an open and modular system."[17] While EBSCO's outsized role in the conception, funding, and current presence in the project must not be overlooked, it is an open-source project and many (mostly academic) libraries have been present since early on. In addition, EBSCO engaged Index Data, a well-respected LIS software firm, to develop the initial technical platform.[18] Index Data also provides services in support of FOLIO for libraries.

Table 2. Open-source ILSs and license types

Open-source ILS	License type
Koha	GPL – Copyleft
OPALS	GPL – Copyleft
Evergreen	GPL – Copyleft
FOLIO	Apache 2.0 – Permissive

Awareness and Use of Open Source in Libraries

While limited to reporting about integrated library systems and platforms, Marshall Breeding's annual *Library Automation Perceptions Reports* show a significant growth in interest in open source in the past decade. The 2012 "survey reflected fairly low levels of interest in migrating to an open-source ILS, even when the company rates their satisfaction with their current proprietary

ILS and its company as poor" compared to the 2022 report that noted "open source products are a routine option in all library sectors."[19]

A closer look at specific sectors reveals a more complicated picture, however. In academic libraries in the US, we see in 2019 that use of open-source software is highest among those academic institutions that offer doctoral programs and lowest among those that offer associate degrees.[20] Awareness was not a barrier to adoption, but among current non-adopters there were surprisingly low levels of intent.[21] In contrast, among public libraries, Choi found in 2021 that awareness was still a barrier for adoption and, moreover, among current non-adopters there was very low intent to migrate to open source in the near future.[22]

Breeding's libraries.org features an extensive database of libraries worldwide and provides data based on library type with which we may draw some inferences. Again, accounting only for ILSs, open-source options currently account for just around 5% of the systems among academic, public, school, and special libraries (see table 3), but again here we see an uneven distribution. The popularity of the OPALS system among small school libraries (78%) may distort the overall picture (see table 4). FOLIO, despite much discussion in field, still has a relatively small footprint, even among medium to large libraries (see table 5). In general, if we exclude OPALS from the calculation we see similar adoption rates of around 8–10% for all libraries. Special libraries have higher rates of open-source adoption ranging from 26% to 30%, but the relatively low sample sizes must be taken into account (see tables 3–5).

In the end, we still see modest adoption rates among libraries of all sizes, barring some outliers among small school and special libraries. Despite anecdotal evidence that interest or discussion of open source in libraries is increasing relative to 10 years ago, that does not seem to have translated into significant adoption rates and, as Choi and Pruett have noted, interest among non-adopters is still low.[23]

An important question, then, is why have open-source solutions not been more widely adopted? While beyond the scope of the current paper, evidence suggests that lack of staffing for maintenance or customization is the biggest barrier blocking adoption, but as we will see later, the introduction of more and more third-party LIS IT support firms could lower that barrier.[24]

Table 3. Open-source ILS/LSP adoption among libraries by type

	Academic libraries		Public libraries		School libraries		Special libraries		Academic, public, school, and special libraries	
	n	Percent	n	Percent	n	Percent	n	Percent	n	Percent
Koha	955	11.43%	3,227	8.98%	406	1.20%	294	25.59%	4,882	6.16%
Evergreen	37	0.44%	1,679	4.67%	49	0.14%	10	0.87%	1,775	2.24%
OPALS	50	0.60%	15	0.04%	1,663	4.92%	39	3.39%	1767	2.23%
FOLIO	81	0.97%	6	0.02%	0	0.00%	3	0.26%	90	0.11%
Open source subtotal	1,123	13.44%	4,927	13.71%	2,118	6.26%	346	30.11%	8,514	10.74%
Grand total	8,358		35,943		33,812		1,149		79,262	

Note: Grand total here equals all libraries identified by type, irrespective of collection size, but excludes those that did not indicate any ILS.

Source: Marshall Breeding, "Libraries.org," accessed December 21, 2022, https://librarytechnology.org/products/marketshare.pl.

Table 4. Open-source ILS/LSP adoption among small libraries by type

	Academic libraries		Public libraries		School libraries		Special libraries		Academic, public, school, and special libraries	
	n	Percent	n	Percent	n	Percent	n	Percent	n	Percent
Koha	136	16.04%	375	9.55%	32	3.90%	57	23.75%	600	10.28%
Evergreen	5	0.59%	177	4.51%	2	0.24%	1	0.42%	185	3.17%
OPALS	10	1.18%	4	0.10%	641	78.17%	14	5.83%	669	11.46%
FOLIO	2	0.24%	0	0.00%	0	0.00%	0	0.00%	2	0.03%
Open source subtotal	153	18.04%	556	14.15%	675	82.32%	72	30.00%	1,456	24.95%
Grand total	848		3,928		820		240		5,836	

Note: Small libraries are defined as those with a collection size of less than 20,000 items.

Source: Marshall Breeding, "Libraries.org," accessed December 21, 2022, https://librarytechnology.org/products/marketshare.pl

Table 5. Open-source ILS/LSP adoption among medium/large libraries by type

	Academic libraries		Public libraries		School libraries		Special libraries		Academic, public, school, and special libraries	
	n	**Percent**	**n**	**Percent**	**n**	**Percent**	**n**	**Percent**	**n**	**Percent**
Koha	368	9.39%	515	7.26%	35	14.52%	56	23.05%	974	8.47%
Evergreen	22	0.56%	656	9.24%	0	0.00%	2	0.82%	680	5.91%
OPALS	17	0.43%	5	0.07%	60	24.90%	3	1.23%	85	0.74%
FOLIO	53	1.35%	1	0.01%	0	0.00%	2	0.82%	56	0.49%
Open source subtotal	460	11.73%	1,177	16.58%	95	39.42%	63	25.93%	1,795	15.61%
Grand total	3,920		7,097		241		243		11,501	

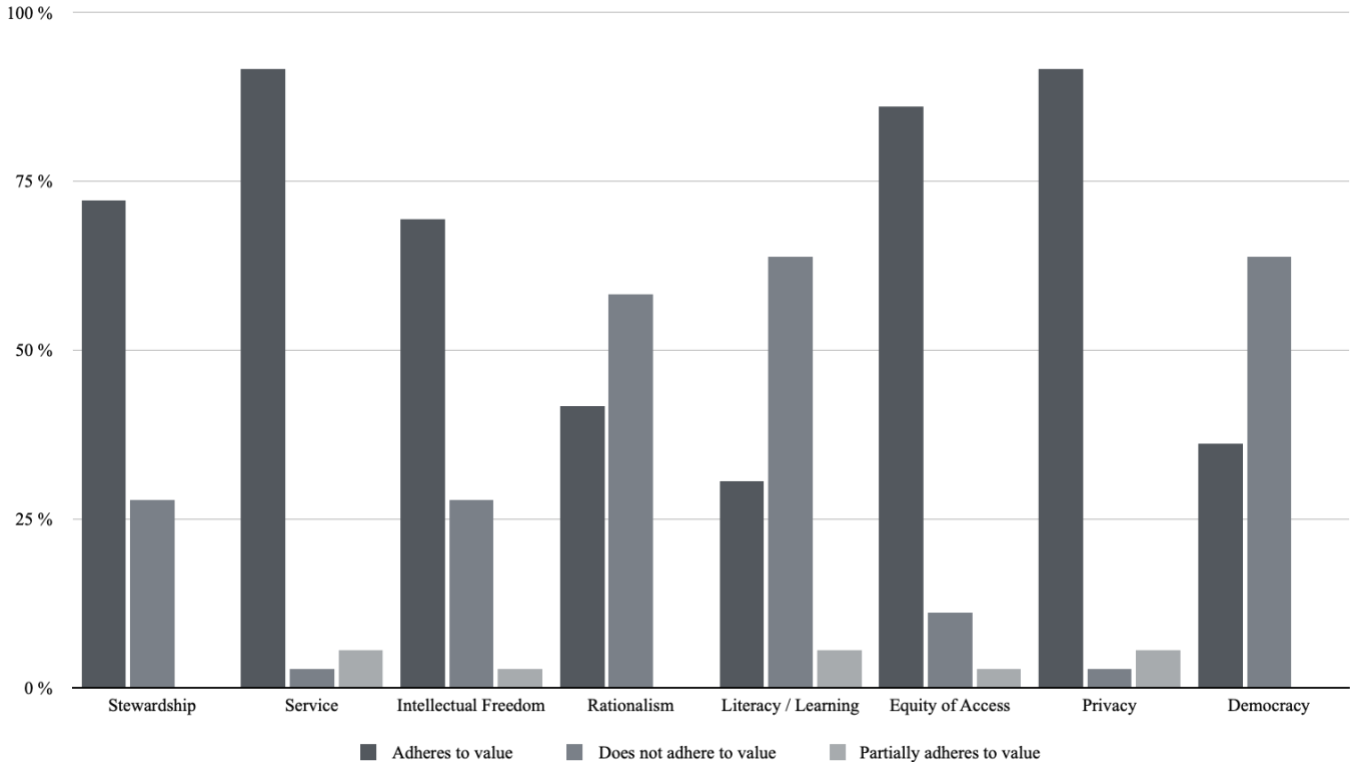
Note: Medium and large libraries are defined as those with a collection size of greater than 19,999 items.
Source: Marshall Breeding, "Libraries.org," accessed December 21, 2022, https://librarytechnology.org/products/marketshare.pl.

Core Values

Though not a monolithic profession, there are values associated with LIS and many argue that they are quite robust and coherent, even internationally. It was, after all, in 1931 when Ranganathan wrote *The Five Laws of Library Science*, asserting that: (1) books are for use, (2) every reader his/her book, (3) every book its reader, (4) save the time of the reader, and (5) the library is a growing organism.[25] Ranganathan's five laws have been interpreted and reinterpreted many times over, but in them we may recognize the values still associated with librarianship. Michael Gorman, the notable library scholar and former president of the American Library Association, expounded on and made explicit the notion of core values during his career, identifying eight: stewardship, service, intellectual freedom, privacy, rationalism, commitment to literacy and learning, equity of access, and democracy.[26] Foster and McMenemy went further and compared the codes of ethics of 36 national library associations and found that of Gorman's eight values, five appeared the most often: *service*, *privacy*, *equity of access*, *stewardship*, and *intellectual freedom* (see fig. 1).[27]

Looking at the values identified here by Ranganathan, Gorman, and Foster and McMenemy, we start to see the intersection of the pragmatic, utilitarian, and moral nonutilitarian stances that define the profession. Regarding open-source technology in libraries, utilitarian considerations have heretofore dominated the discussion, but thanks to the maturation of current technologies and dialog around critical librarianship, librarians may now want to evaluate open source in light of the ethics, ideals, and values associated with LIS. Though there are arguably valid and mutually reinforcing relationships between many of identified values and open source, this discussion will be confined to the five most cited values identified by Foster and McMenemy in the previous paragraph because, owing to their prevalence internationally, these may be considered the most universal.

Figure 1. Percentage of 36 codes of ethics studied by Foster and McMenemy that adhere to Gorman's eight core values.[28]



OPEN SOURCE AND LIBRARIES

Many librarians have long identified the shared values between the profession and the open-source community,[29] but perceived barriers (outlined below) have prevented widespread adoption of open-source technologies. This section addresses the use of open source in libraries considering the five core values identified above and argues that many of those perceived barriers are misguided, outdated, or otherwise not completely applicable.

Service

> Librarianship is a profession defined by service. Every aspect of librarianship, every action that we take as librarians can and should be measured in terms of service.[30]

Perhaps the most fundamental mission of the librarian is to assist patrons in locating the knowledge they seek. In its purest form one might imagine the reference interview, the one-on-one interaction between patron and librarian in which the patron is guided through various resources until the answer is found. But the reference interview only represents one point of contact and its prominence in the popular image of the librarian overshadows the other complex labor that aims to connect the patron with information resources. Technology plays an enormous role in the myriad complex tasks that are performed largely in the background. Indeed, as noted by Barron and Preater, "contemporary librarianship, as practitioners have constructed it, could not exist without library systems."[31] It is, therefore, appropriate to begin a discussion of the use of open source in libraries with a discussion of how those technologies can allow librarians to better serve their communities, specifically how technology costs and functionality can affect service.

Costs

Cost is often the first argument made for open source in libraries and given the perennial budget constraints of many libraries, it is easy to see why. The largest cost advantage of open source comes from the elimination of license fees and support flexibility. Since the code is open and not owned by anyone, vendors cannot demand fees for the use of the software or per user/per installation fees. Users are free to use the software as they wish, limited in most cases only by hardware availability and in some cases technical expertise. Corrado goes further and notes "open-source software not only has a lower acquisition cost than proprietary software, it often has lower evaluation/implementation and support costs as well."[32] Indeed, as noted by Choi and Pruett in their examination of open source adoption in academic libraries, the "ability to download and test the software in advance" was the fourth most cited driver for choosing open source.[33]

While there are often lower costs associated with open source, there are still costs, especially with support and infrastructure. Some libraries will already have the technical expertise and physical hosting capacity to maintain and run open-source systems, and other "organizations will contract with specialized firms for the services needed to operate the software with the levels of reliability and performance expected for critical business functions."[34] The perceived lack of in-house technical expertise is a common barrier among libraries that are considering open-source solutions, but here again open source presents opportunities for libraries.[35] Instead of a single firm that produces the software and provides support, open source allows libraries to select options best suited for them based on the on-site expertise and physical capacity already available.

Flexibility and avoidance of vendor lock-in are closely tied to any discussion of cost and have been noted as significant drivers in choosing open source.[36] The main distinction between support for proprietary and open-source systems is that with proprietary systems, support is generally limited to the firm that developed the software. If there is an issue that requires additional expertise, a library may be required to purchase an elevated support tier or may be otherwise waiting for a bug to be fixed or feature introduced at the discretion of the firm.[37] In the open-source support world on the other hand, there are more options: first with regard to the companies providing support—if company A cannot or will not provide the desired level of support, company B may be a better option—and second, there are more options from the user community—if several users want a certain feature, they may work together to develop it and contribute it back to the project, making it available for everyone. Or, as with projects that have formalized decision-making structures, they may decide to become active within the governance bodies to steer a project in a certain direction. Moreover, support for an issue may already be openly available in the form of online documentation or user-driven support forums. So, while potentially spending less on support and infrastructure that is at the same time more bespoke, a library can support vendors and communities whose values more closely align with their own and can avoid being locked into lengthy service agreements (vendor lock-in) with the developers of the software.[38] Today there is a robust ecosystem around open source, providing support and hosting solutions.

Arguably one of the most prominent current examples in the open-source library community is ByWater Solutions. ByWater Solutions started in 2009 to provide support for the open-source Koha ILS, and while it was not the first firm set up to support open-source library systems, it differed notably from some predecessors such as PTFS (née LibLime) because it strived to have a collaborative relationship with the global Koha community. Other prominent examples include Catalyst, Equinox, and PTFS Europe (not related to PTFS cited above).

While cost is an oft-cited reason for interest in or adoption of open source, in 2006 Marshall Breeding noted that "concerted interest in open source ILSs began," not primarily out of budgetary concerns but rather frustration with the functionality of proprietary ILS options.[39]

Quality/Functionality/Customization

As the expectations of patrons change, the need for more and more sophisticated technology increases year on year, and as the needs of each institution are different, the desire to customize that technology to meet those needs increases in kind, creating a source of tension between libraries and library software vendors in the process. Private firms, especially publicly traded ones, are under pressure to make the minimum viable product to maximize profits, hardly an offense for a for-profit company, but it does represent the divergent interests of firms and libraries.[40]

Functionality and customization are at once barriers to and drivers for adopting open-source solutions, and this fact alone demonstrates the continued misconceptions around open source in libraries.[41] Still, for the present argument it is sufficient to say that, despite earlier doubts around the open-source development model and the quality of the software, the continuous growth in popularity of open source has proved it is a legitimate alternative to proprietary systems in terms of quality. Indeed, perhaps the strongest argument for the quality of open-source technology can be made by the firms that produce proprietary software, including in the library sector, since many of them use open-source technology in their own software. For example, Ex Libris's Alma system, used by 36% of academic libraries in the US in mid-2022, relies on the open-source Apache Solr for its search index.[42]

Another part of providing the best service to patrons is being able to evaluate how our systems function and how they serve results. The black-box nature of proprietary systems (i.e., we know what goes in and what comes out, but have little notion of what decisions are made within) means that librarians' ability to serve their patrons is at times significantly hindered. For example, as Corrado has noted, the inclusion or exclusion of open-access journals in the indices of proprietary discovery systems such as EBSCO Discovery Services (EDS) and Ex Libris's Primo, while not as opaque as academic search engines such as Google Scholar, is not always transparent.[43] This could represent a specific problem for some libraries, but it also speaks to a more fundamental problem. Because of the nature of software development and the business models of private firms, there is an associative amount of "protected" information that may be considered trade sensitive, and whenever it is not clear how a system arrived at, or delivered, a specific piece of information, that creates a power differential and disadvantages libraries and users. Smith and Hanson go further to note that the uneven power dynamics in library services limits patrons' access to information and can limit librarians' ability to work toward socially just outcomes.[44] The increased transparency of open-source systems may provide librarians the means to better serve users by allowing them to better understand how library or discovery systems are serving results to users, ultimately helping them more easily find relevant information.

The current dominant paradigm in LIS is that libraries pay companies for access to mission-critical systems. All support and development are provided by one firm. If there are problems or bugs, librarians must dedicate resources to reporting those to the firm to be fixed (or not) at the discretion of the developer. Barron and Preater, referring to Galvan's "Architecture of Authority," noted that "whereas community developers are actively contributing to open source projects, systems librarians contributing to supplier-hosted community areas are providing free labor to improve a system for which they have already paid: 'We're one of the only industries that pays for

the privilege of improving products, just to get them to work the way we needed them to in the first place.'"[45] Librarians contributing to proprietary systems (that they have already paid for) provides a particularly stark illustration of an exploitative power dynamic. Of course, private enterprise will continue to profit from the unpaid labor of open-source contributors as long as their systems are built on top of open-source packages (e.g., ElasticSearch, Apache Server and Solr, NGINX, and MariaDB, to name the most obvious), but at least libraries will not pay twice—once for the product, second for the labor to improve the product— as in the current model.

In the end, proprietary firms and open source both have the capacity to produce modern, high-quality systems, but all things being equal, open source has the added advantage of transparency and control, which reinforces rather than compromises the core values of the profession.

Privacy

Libraries have an obligation to ensure the privacy of those who use their services. The use of remotely hosted proprietary software suites can make that difficult, impossible, or at the very least difficult to appraise. The dominant model for ILS hosting is now one in which the provider also hosts the software on their own servers, as opposed to locally installed instances. Patron data—from name, birthdate, and home address to search queries and circulation records—are now often stored in remote databases that system administrators may not have complete access to. The terms of use of this data are detailed in the vendor's privacy policy, which may change over time. Due to limited capacity, libraries may not have the time or resources to review in detail each vendors' privacy policy or each change to that policy.

Remotely hosting library systems provides advantages of scale for the ILS providers and may reduce the IT costs of the library, while also representing an outsourcing of library IT labor, but it also represents another point where we see power dynamics shifting in favor of ILS firms. With less control of and access to the systems used in the library, librarians are disadvantaged. Moreover, warehousing the data of many libraries in one place may create a more attractive target for nefarious actors. For libraries without on-site IT knowledge, having a system hosted remotely on servers maintained by dedicated professional staff offers clear advantages, and obviously using open-source software doesn't immediately eliminate privacy concerns, but it does shift the power dynamic back to the librarian and enhances their agency in terms of proactively protecting users' interests. As we will see below privacy also features in discussions of stewardship and intellectual freedom.

Equity of Access

The technologies used in LIS are designed to either allow librarians to better serve their patrons or, in many cases, to allow patrons themselves to directly access knowledge. They are therefore, essential to any discussion of equity of access, a "basic premise that everyone has a right to have access to library resources and services, irrespective of who they are and where and under which conditions they live."[46] Making high-quality, modern technology available with the lowest possible barrier is important to providing that access, and as noted previously, producing high-quality software is one area where open-source technology excels.

It was also noted above, in the discussion of cost, that depending on the required third-party support and infrastructure, open source is often a less costly solution. The absence of annual licensing fees means that a larger portion of the money invested in systems will go towards development and maintenance, activities that directly serve the user.

Stewardship

According to Gorman, "stewardship in the library context has three components: the preservation of the human record to ensure that future generations know what we know, the care and nurture of education for librarianship so that we pass on our best professional values and practices, [and] the care and maintenance of our libraries so that we earn the respect of our communities."[47] Referring to Gorman's first point, Henderson notes that, "libraries play this archival role because history has shown that it is not economically viable for profit-based businesses to do so."[48] The most pressing threat posed by closed-source technology to this concept of stewardship is long-term access to the proprietary systems and formats that contain and transmit knowledge. Paradoxically, this brings us to another one of the main reasons, as identified by Wilson and Mitchell, that libraries are reluctant to adopt open source: "The risks involved in using OSS are too great." Namely, libraries are worried about investing in systems where no single company is responsible for their development.[49] While true that generally no single entity is solely responsible for development, that can be an advantage. With the barriers to the transit of capital across national borders reduced or eliminated and the liberalization of financial markets in many parts of the world comes the consolidation of industries, including the publishing and library technology sectors, a topic familiar to most librarians. When one firm acquires another, priorities may change, and as trends, tastes, and the economic environments change, technologies may be rendered uneconomical, redundant, and ultimately useless. This can mean that a piece of software or file format that was in active development one day is shelved the next, its proprietary source code permanently frozen and support for it curtailed and eventually eliminated at the earliest possible moment that is contractually possible. Users are left locked into an increasingly out-of-date technology, exposed to data security vulnerabilities (creating potential privacy issues among other problems), or faced with the costly prospect of migrating to a new system.

This scenario is taken for granted today, because operating at the whims of technology firms is a common occurrence, but the open-source model offers an alternative. There is nothing preventing interest in a particular piece of open-source software from waning for some of the same reasons as mentioned for closed-source software (changing trends, tastes, etc.), but what happens next is fundamentally different. Instead of the source code being permanently frozen in a firm's archives, anyone could take the open-source code and update it or adapt it for future use. If a group of libraries are all using a piece of open-source software that is no longer actively developed by the community, they could pool their resources to adapt or update the software to their needs and maintain functionality and address security issues.

Intellectual Freedom

Intellectual freedom is perhaps the most obvious value shared by the open source and LIS communities. If we return briefly to the formative ideas around the open-source movement, intellectual freedom is central, especially when viewed in light of the freedoms to run, study, share, and modify source code outlined in the initial GNU GPL license. Applied to traditional libraries these freedoms might be reinterpreted as *read*, study, share, and modify, and often "intellectual freedom begins with opposition to censorship of books and other library materials."[50] But it should apply no less to computer code. Supporting open source and a model of knowledge creation that eschews copyright maximalism and embraces the information commons reinforces librarianship's own values around intellectual freedom.

To return again briefly to privacy, it is also necessary to intellectual freedom, representing another, indirect, relationship between open source and libraries promotion of intellectual freedom.[51] Without privacy, patrons cannot fully utilize the information resources available to

them. "Protecting information privacy allows individuals to feel free to sample the marketplace of ideas without fear of interference or scrutiny, which could inhibit curiosity."[52]

The prevalence of these and other core values within the LIS community are a proclamation of what is important to the profession. They help guide practitioners and help us to keep our focus on the communities we serve. That doesn't mean there isn't any room for interpretation; indeed, as seen in figure 1, the core values we have identified here are interpreted differently and are adhered to, to varying degrees in different places. It is the responsibility of each of us to apply these values to the work we do each day.

A CRITICAL APPRAISAL OF CURRENT TRENDS

It's hard to discuss the current state of open source in libraries without talking about FOLIO, or the **F**uture **o**f **L**ibraries **i**s **O**pen. The enthusiasm behind FOLIO is notable and its early adoption among large established academic libraries is impressive, especially for an open-source project, but the prominent role that the private sector plays in its development deserves critical examination. Indeed, with the introduction of the FOLIO library services platform (LSP), it is worth looking more closely at a strategy among private companies to leverage open-source technology (and the labor behind it) to bolster profits and reputational capital.

Already in 1999, Eric Raymond identified "open development," a term used by Linus Torvalds to describe what would become known as open source, and "decentralized peer review" to "lower costs and improve software quality."[53] "Open innovation," as it became known, is a business model designed to profit from open-source technology.[54] With the ascension of open innovation, the dominant justification was no longer civic but rather industrial (efficiency, quality, scale) and market (competition, profit), and there are many examples.

In recent years, there has been much discussion of Microsoft shipping a Linux kernel inside of Windows because this would have been unimaginable twenty years ago when Steve Balmer declared that "Linux is a cancer that attaches itself in an intellectual property sense to everything it touches"—presumably a reference to the GNU GPL's requirement that derivative works carry the same open license.[55] As more permissive licenses were introduced, Microsoft has been making more and more moves towards interoperability between its own systems and open source. Setting aside the 2014 statement from its then CEO that "Microsoft ♥ Linux," Microsoft's approach to open source has been largely calculated and pragmatic, a strategy to ensure that its Azure cloud computing service can host systems that the vast majority of the web runs on.[56] Still, its 2019 purchase of code-sharing platform GitHub for $7.5 billion was a testament to the fact that Microsoft saw value in open innovation and open source.[57]

The same could be said of Google. When suddenly confronted with a major competitor potentially cornering the market for mobile operating systems (the 2007 release of Apple's iOS), Google decided to put its energies into supporting the development of the Android Open Source Project (AOSP) and building proprietary components on top of it. AOSP is the open-source base underpinning Android. AOSP is, as the name suggests, open source, whereas Android includes many proprietary critical components. This is made possible because AOSP is licensed with a permissive open-source license (Apache 2) that does not require derivative works to have a similarly open license. As time passed, Google introduced more and more closed-source components that mirrored essential AOSP functionality, at which point in many cases development on the AOSP counterpart ceased, at least from Google's perspective. This has left the original AOSP project largely unusable without additional (now) proprietary components.

The most explicative for our discussion however is IBM. IBM became the first major firm to pivot in supporting open source when, in 2001, it announced that it would invest $1 billion in open-source development. IBM's then CEO Lou Gerstner explained the company's shift to investing in open source and the proprietary software that it planned to develop on top of it when he earnestly commented "giving one away helps increase sales of the other."[58] Pamela Samuelson went further: "There are at least three stories one can tell about this shift. IBM's adoption of open source can be viewed: as an anti-Microsoft strategy; as a consequence of changed business models in the software industry; and as a manifestation of an open innovation strategy for promoting faster and more robust technical advances."[59] If we take this quote and replace IBM with EBSCO and Microsoft with ProQuest, we may have a ready-made explanation of FOLIO as well.

Around the same time that its competitor ProQuest purchased library system developer Ex Libris in 2015, EBSCO announced the launch of a competing open-source platform, FOLIO. After initial discussions were carried out in the first half of 2015, formal approval arrived in the autumn of the same year, and development began in earnest soon after.[60] Irrespective of motivations, the decision leveraged the predictable community enthusiasm for open source, while reaping the benefits of that community's efforts to develop the platform. According to EBSCO Executive Vice President Sam Brooks, "EBSCO will contribute more than any previous library vendor has to an open source project, comparable or greater than what other organizations have invested in creating proprietary LSPs."[61] Ettlinger notes that "through a series of calculated tactics, firms can appear to be altruistically contributing technologies to the public domain, while indirectly promoting demand for their products."[62] Beyond the direct profits earned as a FOLIO service and hosting provider, the benefits for EBSCO—from gaining foundational access to a library system platform that has been built to its own specifications to acquiring reputational capital, capital that, among some in the LIS community, frames the firm as a benevolent and selfless patron of libraries—are clear. Librarians must evaluate whether this is the best model for libraries and their patrons. The potential benefits of a robust, versatile, and scalable open-source library system for the LIS community are great, but librarians must ensure that the core values that shape the profession are not compromised during its development.

ALTERNATIVE MODELS

The communities that have emerged around projects such as Koha and Evergreen are sizable and have resulted in robust systems. Other examples, such as the Kuali OLE, were less successful. It is beyond the scope of this paper to examine the specific reasons for the relative successes of some projects compared to others, but it may be valuable to briefly explore some alternative models to private enterprise-led open-source development, since as seen above, those models may not represent the best interest of libraries or the public in terms of core values.

With open source, the community around a project is key to its success, but funding and leadership are also essential. First, funding to develop open-source library systems can come from anyone who is interested in the project, but with funding comes the ability to directly or indirectly steer the project. Therefore, there is a strong argument for such projects to be largely publicly funded. Making libraries better and more accessible is in the public interest. Libraries are a legitimate recipient of public funding, and that extends to the software that makes possible many of the services that users have come to expect.

To look briefly at Europe and the United States, there are several potential partners. In Europe, the European Union and its member states have, in recent years, committed in various ways to

promoting and using open source.[63] The EU's stated motivations, or operational principles as first laid out in the 2018 European Commission Digital Strategy, are digital by default, security and privacy, openness and transparency, interoperability and cross-border, and user-centric/data-driven/agile.[64] There is obvious overlap here with the identified values of librarianship and the EU has already shown itself to be a valuable partner to libraries through such efforts as the Europeana project.[65] At the national level there are many prospective supporters present including the German Research Foundation (*Deutsche Forschungsgemeinschaft*) with an annual budget of €3.6 billion in 2021,[66] the Belgian Science Policy Office (BELSPO), the Dutch Research Council (*Nederlandse Organisatie voor Wetenschappelijk Onderzoek*), the French National Research Agency (*Agence Nationale de la Recherche*), and the Italian National Research Agency (*Agenzia Nazionale per la Ricerca*) among others. In the US, the Institute of Museum and Library Services, established in 1996, is a logical source of funding as its mission is "to advance, support, and empower America's museums, libraries, and related organizations through grantmaking, research, and policy development."[67]

As for leadership, again there is a strong argument to be made for stakeholders, in this case libraries themselves, to govern and steer open-source LIS projects. This requires open and transparent governance that again reflects the values of the profession, e.g., equity of access. There is a long history of national libraries leading publicly funded projects, from the Library of Congress developing any number of technologies, including MARC records, to the Koninklijke Bibliotheek providing administrative support to Europeana. There is also room for library consortia or associations to lead these efforts. In Germany, for example, regional library consortia have been developing and sharing library-related technology for years, including widely used solutions such as DBIS (*Datenbank-infosystem*), the EZB (*Elektronische Zeitschriftenbibliothek*), and OPUS 4. Indeed, the participation of several German library consortia (among many other international library partners) in the FOLIO project suggests that it will not likely become locked to any one private-sector actor. Though, given the foundational support provided by some, EBSCO and Index Data in particular, it may be difficult to imagine the project continuing if that support was to suddenly vanish.

As profits dictate corporate acquisitions and acquisitions dictate priorities, librarianship is often placed at a disadvantage. Librarians and libraries must evaluate whether a more sustainable solution may be found in a model that is publicly funded and led by libraries.

CONCLUSION

Open-source technology presents a valuable opportunity to libraries and librarians to better serve their users by supporting the core values of the profession. Supporting these core values is both pragmatic (aligned with the core value *service*) and moral-idealistic (aligned with the core values *privacy*, *equity of access*, *stewardship,* and *intellectual freedom).* At the same time, it is important for librarians to critically evaluate and challenge cultural assumptions around the current state of open source and the inherent power dynamics, and information as a commodity.

Awareness and use of open source continue to increase among libraries of all sizes, but research suggests disparities between different types and sizes of libraries. Moreover, the nuances regarding open-source technology are rarely addressed in the literature. In order to further promote its shared values and enrich the profession, librarianship as a whole should formally address and support open source through further codification, institutionalization, and investigation. This could be done by including open source in the accreditation requirements for

LIS degree programs, for instance, inclusion in the technology section of the ALA's *Core Competences of Librarianship.*[68] Individual librarians are encouraged to explore toolkits like Awesome Self-Hosted (https://selfhosted.libhunt.com/) and to continue to develop and promote open source in their libraries. Turning to communities such as Code{4}Lib (https://code4lib.org/) and the EU's Open Source Observatory (https://joinup.ec.europa.eu/collection/open-source-observatory-osor/) for questions or to share experiences is also valuable.

Once awareness of open source and its nuances are more widespread within the profession, we may start to have more critical conversations about the most beneficial ways of using the technology to better serve our users.

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