Teitl - Title: Open source, open minds?: An investigation into attitudes towards open source library management systems in UK higher education libraries

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Open source, open minds?: An investigation into attitudes towards open source library management systems in UK higher education libraries

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Introduction

In recent years, mergers have dominated the LMS industry, with the buyout of Dynix by Sirsi in 2005 (Rogers, 2005) and the acquisition of Endeavor by Francisco Partners, owners of Ex Libris, in 2006 (Ex Libris, 2006) being notable examples. This has resulted in popular LMS products being discontinued leading to frustration as libraries feel forced to migrate to new LMSs which "may not be much better than the old system" (Wang, 2009, p. 210). The decision by SirsiDynix to discontinue development of its Horizon LMS led to British Columbia public libraries considering the Evergreen open source LMS, as the risk associated with it "was suddenly no greater" than that associated with a proprietary system (Hyman & Walker, 2008, p. 4). Several drivers towards open source library systems are also evident, such as strategic moves towards collaboration and shared services promoting greater interoperability and consortia, the development of SaaS, and the suggestion of a community source model based on Kuali OLE in the SCONUL HEFCE Shared Services Study (Sero Consulting Ltd., 2009). Handsworth Grammar School, which implemented Koha in 2005 (Tedd, 2007), was an early UK adopter. Koha was also chosen by the NHS Eastern Counties Library and Knowledge Services Alliance in 2007. UK public libraries have been slower to adopt open source LMSs, though the February 2011 announcement of Stirling and East Dunbartonshire Councils' selection of Evergreen (Shell, 2011) illustrates a significant move in that direction. . Staffordshire University is currently the only UK higher education library to have announced their intention to use an open source LMS (Dimant, 2010).

Attitudes towards open source systems (see Raymond (2001) for an overview of the open source movement) are becoming more favourable: the general zeitgeist is clearly illustrated by UK Government's recent promises to move towards open source solutions wherever possible (see Cabinet Office website). Open source solutions are reported in relation to

teaching and learning in higher education and to administration and management (e.g. Williams van Rooig, 2011, 2012, Walker and Miles, 2012). What is of interest in this current project is whether this general attitude extends to higher education libraries. To date, little research has been conducted into attitudes towards open source LMSs within higher education libraries. A significant contribution to the literature is the survey conducted by Adamson et al (2008) as part of a JISC and SCONUL project to investigate attitudes towards LMSs in higher education libraries, which included some examination of open source alternatives. The aim of the current project, which takes the Adamson survey as a starting point, is to investigate whether opinion has changed much since 2008. In addition, it aims to explore the reasons behind the lack of adoption within the sector and investigate whether drivers towards interoperability, cloud computing and community models will increase the uptake of these systems. This study enriches the body of knowledge on open source library management systems by reporting and reflecting on the results of a survey and set of interviews with higher education information professionals. In addition, as most of the literature on open source LMS adoption has focused on North America, this paper provides a novel contribution to the literature.

Background

Over the last decade, the LMS (library management system) has been supplemented by a growing range of add-on products designed primarily to aid libraries in managing digital collections. The OPAC has been superseded by next generation interfaces working independently from the LMS (Breeding, 2007b, p. 39) and characterised by Web 2.0 functionality, such as user tagging and reviews, faceted navigation and vertical search capabilities (Trainor, 2009). Other programs key to modern library operations have emerged independently of the LMS, such as electronic resource management (ERM) software and institutional repositories (Pace, 2009). Financial constraints may also be responsible for the recent lack of development to the LMS. Wang (2009) contrasts the mounting price tag for new technologies with the "limited or shrinking budget" (p.209) faced by many libraries, not helped by the recession (Breeding, 2009d), and software vendors have found that customers are unable "to pay realistic licensing fees" (Schneider, 2009, p. 17). This situation is further exacerbated by the saturated market, with vendors relying on existing customers for income (Rhyno, 2008).

The UK LMS market is seen as "relatively insignificant in the global corporate context" (Adamson et al, 2008, p. 8), and "dominated by four vendors with little differentiation" (p. 5). The LMS replacement cycle in UK higher education is particularly slow with one difference to the North American market being the lack of rich, privately funded UK institutions (Adamson et al,2008). Some commentators (e.g. Kinner and Rigda, 2009) believe that the future of the LMS will depend on the willingness of vendors to allow other products to work with core modules, for example with Finance and Human Resources systems (Ruschoff, 2008), or integration with the Virtual Learning Environment in academic environments (Adamson et al., 2008). Vendors have recognised that interoperability can create new business opportunities in a saturated market (Adamson et al., 2008), and this has led to the development of Application Programming Interfaces (APIs).

Open source library management systems

The synergy between the open source movement and libraries is a recurring theme in the literature (e.g. Chudnov, 1999, Jaffe and Careaga, 2007, Rhyno, 2008; Krishnamurthy, 2008 ; Rafiq, 2009), and writers such as Bissels, (2008), Caldwell (2007), Chad (2007) and Tedd (2007) agree that open source LMSs are now a viable solution. Despite this, evidence suggests libraries have been slow to adopt OSS (open source software), particularly in the UK. In 2007, Jaffe and Careaga found only around 41% of library web servers running open source software, far lower than the 73% of respondents to a general survey, and while there are many articles in the literature about open source in libraries, few of these are case studies (Jaffe & Careaga, 2007). Hoy and Koopman (2008) argued that, due to the risk averse nature of libraries, many only consider OSS for non-critical services, and that the parent institution's information technology infrastructure may dictate what library software can be used, with the academic environment being notoriously conservative in this respect.

The literature suggests a variety of reasons for the slow adoption of OSS, including barriers caused by procurement procedures, issues with functionality and stability, the technical ability required to modify source code and concerns over forking (independent development of the source code leading to incompatibility) and poor documentation. Adamson et al. (2008) argue that the staff and support overheads for such systems are unworkable and that American experience indicates that OSS does not mean cheaper or more interoperable LMSs. They also question the benefit in adopting open source LMSs based on "established processes" (p.22), while advocating moving towards OSS components as building blocks for

a LMS. Breeding (2008b) suggests the more formalised European procurement process could be responsible.

In order to gain widespread adoption, OSS must perform well against procurement procedures (Breeding, 2008a, p. 38) such as the European Invitation To Tender (ITT) legislation derided by Adamson et al. as "costly, time consuming and complex" (2008, p. 77). OSS Watch notes that selecting a procurement process effectively means choosing between commercial software and OSS (Chad, 2007), and Jaffe and Careaga (2007) argue that "if the purchasing department employs [a procurement] process or requires signed vendor contracts it is going to be... harder to get open source in the door" (p.11). Pace (2009, pp. 647-648) suggests that "increasing levels of trust [are] being placed in cloud computing by [the] younger generation", and mirroring this development is Software-as-a-Service (SaaS), where the vendor or a third-party company provides hosting, upgrades and maintenance. SaaS is becoming popular among smaller overseas libraries and is being offered both by proprietary LMS vendors and open source support companies such as LibLime (Breeding, 2009a).

Commercial support is seen as a key ingredient in adoption of open source LMSs (Breeding, 2008a), perhaps because libraries are unlikely to switch from contracted maintenance to paying for local support (Breeding, 2002). When the vendor is responsible for hardware maintenance, Breeding argues, "the perception that OSS implementation requires more in-house expertise no longer applies" (2008a, p. 39). Of the libraries that implement open source LMSs, "the vast majority... work with commercial companies" (Breeding, 2009b, p. 21). Adamson et al. (2008 claim that SaaS could help "leverage consortium buying power" (p .31) and that a "consortium of H.E. libraries... could benefit from a critical mass of reader feedback and click patterns as well as from reduced maintenance costs" (p. 34). While this model may lead to increasing uptake of open source LMS, it arguably also blurs the boundaries between open source and proprietary software. Hopkinson (2009, p. 311) claims there is little difference "between paying a developer or a third party" and that institutions may feel "no differently being supported by the commercial OSS support companies" than by proprietary vendors.

Unlike other open source projects such as Linux, where hobbyists provide much of the code, most development in open source LMSs is sponsored by libraries (Breeding, 2009b). One significant move is the launch of Enterprise Koha, a SaaS version hosted by LibLime, where development will focus on features requested by customers and will first be made available to

subscribers before being later added to the code base. This was seen as a fork (Hadro, 2009a), though because the software is hosted it is not in breach of the GPL licence (Tennant, 2009). O'Reilly (2005) claims that similar models, used by Google and Amazon, "provide[s] the most serious challenge to the traditional understanding of FOSS" (p. 466) by hosting commercial implementations of open source software without being constrained by GPL protection, which is only triggered by software distribution.

An overview of the major themes in the literature can be found in Table 1.

Methodology

A quantitative online questionnaire and qualitative interviews were used to gain an understanding of attitudes towards open source LMSs in UK higher education libraries and to establish why the sector has been slow to adopt this emerging technology. The choice of questionnaire and interview was deliberate to ensure the richness and completeness of the data. The study was concerned to capture attitudes, and it was felt that while quantitative methods allowed for an overview of the current situation, interviewing would facilitate the capture of in-depth affective and attitudinal responses. Two hundred and forty-five higher education level teaching institutes were identified from the UCAS list of universities and colleges and the Wikipedia entry for UK universities, including some privately funded. The survey was sent to a relevant, current contact in the following order of preference:

- Library-specific systems manager or administrator;
- Electronic resources manager or administrator;
- Head of library services;
- Library helpdesk or administrator.

An email requesting contact details was sent to institutions with no library information on their website. Six emails were returned due to incorrect addresses and six institutions confirmed that they did not have a library service; these were removed from the list of participants. Fifty-two institutions which did not respond, mainly privately funded, were also removed from the list to avoid responses from staff without an understanding of their library. Some institutions in the list are partners or affiliates. These were treated as separate institutions since many have separate LMSs; for example at the University of London, Birkbeck use Horizon while St George's use Unicorn (Adamson et al, 2008). This left a total

of 181 contacts for the survey, eliminating the need for sampling and therefore possible sampling error. A pilot was conducted in November 2010, and the final questionnaire was hosted in Survey Monkey.

Questionnaire design

A copy of the final questionnaire can be found in the Appendix. A funnelling technique was used with general questions being asked first, gradually leading to focussed questions relating to open source LMSs. Permission was granted to use three questions from Adamson et al. (2008) by David Kay of Sero Consulting to indicate whether attitudes towards open source LMSs have shifted over the last three years.

As the questionnaire was intended as a quantitative instrument, closed-ended questions were mainly used. Hyperlinks to Google Definitions (Google, n.d.) and Wikipedia (n.d.) were used to provide definitions of key terms with no positive or negative associations. Despite the inclusion of definitions, it may not be possible or even desirable to reduce emotional responses to such terms as this could have an effect on survey responses. A Likert scale was used in several questions to capture respondents' attitudes. Balanced, five point scales were used where possible with neutral centre options included to provide an unbiased choice for those with little experience of the topic. The three questions taken from Adamson et al. (2008) were not balanced, but were left unchanged to increase the validity of the comparison between the two questionnaires. Question 24 used an equal number of intermingled negative and positive statements to prevent respondents from producing a biased result when selecting the same answer for each, and to help identify answers exhibiting "response sets" (Bryman, 2008, p. 147). Results from Survey Monkey were exported in text format and imported into SPSS for analysis using a codebook. SPSS data was exported to Microsoft Excel for tables and graphs to be produced. Qualitative comments from question 26 were exported and analysed with the interviews in a separate spreadsheet. All data processing was done by the principal researcher to prevent inter-coder error.

Interviews

Five interviews were held between April and June 2011. A purposive sample was used to ensure variety. The 16 questionnaire respondents willing to be interviewed were allocated a score based on their responses to three questions: 16 "Which statement best describes your personal attitude to open source software"; 18 "How likely is it that your institution will

adopt an open source LMS in the future"; and 19 "Which statement best describes your institution's current involvement with open source LMS". The lowest scores are likely to represent candidates or institutions with a positive opinion of OSS and the highest those with a negative opinion. The respondents with the highest and lowest scores were chosen alongside three other respondents from across the range of results, selected to ensure a sample from institutions of different sizes and types. Demographic characteristics of the interviewees are shown in table 2. Following a pilot interview, a schedule was used to conduct semi-structured interviews by telephone. Some questions were omitted depending on participants' previous responses and additional probing questions were asked where useful. The interviews were recorded with a speakerphone and digital voice recorder.

Table 2 here

Interviews were analysed for key themes identified during the literature review and survey, using a coded spreadsheet. Additional themes discovered during transcription were added to the spreadsheet during analysis. While the survey could be completed anonymously, respondents were invited to provide their email address if willing to be interviewed or requesting a copy of the results. Guidance was given in the introduction about the usage of personal data supplied. All data was dealt with in accordance with the Data Protection Act 1998.

Reflections on Research Methods

There are several limitations to the research which may affect the validity of the findings. Firstly, the fifty-eight institutions whose library service could not be contacted did not receive the invitation. This represents a sizeable portion of the total population (23.7%). Invitation recipients with strong feelings towards open source may have been more likely to complete the questionnaire. Criticism levelled at Breeding's (2010) survey by Scott (2010), who claims that respondents number a small proportion of the libraries in the country, are self-selected and "therefore more likely to either have an axe to grind or a selection decision to defend", could also apply to this study. Although IP address recognition prevented respondents from completing the survey more than once on the same computer, it is possible that respondents have entered multiple replies using different computers. Despite the replication of the three questions from Adamson et al. (2008), respondents may not be from the same institutions, limiting validity in comparisons between the two surveys, especially given the response rate of 50% or below in both. Since Adamson et al. conducted a wider

survey about LMSs, it is also possible that the author's study attracted a larger proportion of respondents with an interest in OSS.

Although particular care was taken to portray a neutral opinion towards OSS throughout the questionnaire, it is evident in retrospect that there is no negative equivalent to question 25, which cites advantages to open source LMSs. It is possible this led to participants with less favourable opinions towards OSS viewing the survey in a negative light, and exiting prior to completion, leading to bias in the results.

Despite the care taken to select a range of interviewees, it is notable that no respondents with the two highest scores agreed to participate (see Figure 1). This suggests a bias towards those who favour OSS. The interviews with lower scoring participants, i.e. those likely to have a more positive opinion of open source, generally lasted longer than interviews with higher scoring participants. The shortest interview was with the candidate with the highest score. Those enthusiastic about OSS seemed more willing to provide detailed answers.

Figure 1 here

Questionnaire Results

Eighty-four questionnaire replies were received which, out of 181 invitations, equates to a response rate of 46.4%. Of these, 75 were complete and 9 partially complete; percentages in the following results therefore refer to the proportion of replies to each individual question. Figures not stated as percentages in the results which follow refer to the actual number of answers. If the total population is considered to be 245 institutions, and each response is taken to be from a different institution, 34% of the population completed the survey. If respondents had been selected through probability sampling, this would result in a confidence interval of 8.69 at a confidence level of 95%. As respondents were effectively self-selected, this confidence interval is of limited value.

Participants were asked to specify the number of staff in their library to indicate the size of their institution. As Figure 2 shows, responses were received from staff in a range of different sized libraries, though notably less from those with more than 250 staff.

Figure 2 here

Respondents were asked which LMS supplier they used; the top four were identical to Adamson et al. (2008) aiding external validity. 82% of respondents used these suppliers (see Table 3), which compares with 87% in Adamson et al. (2008).

Table 3 here

A majority of respondents purchased their LMS between 1993 and 2000 as shown in Figure 3. Purchases declined throughout the 2000s until 2010.

Figure 3 here

Most respondents were either very satisfied or satisfied with their current LMS (72.6%), vendor (62.6%) and support (69.6). Most LMS servers are hosted in the I.T. department (54 replies, or 64%); 16 (19%) are hosted within respondents' libraries, 10 are hosted by other institutions, and 4 elsewhere. None are vendor-hosted in a Software-as-a-Service arrangement. Sixty seven are regularly updated, 13 have only bug fixes or minor updates being released and 1 is no longer being upgraded. 58 respondents have no current plans to change their LMS; of the remainder, 4 intend to change between August 2011 and July 2012, 3 between August 2012 and July 2013, and 9 between August 2013 and July 2014.

A formal purchasing procedure was followed by 60% of respondents when selecting their current LMS, of which 41% followed the EU tendering legislation, and 19% undertook a formal institutional purchasing procedure outside EU tendering legislation.

Table 4 here

78 of respondents' (92%) libraries were involved in the LMS selection process. Of the remaining 6, 4 did not know who was involved. Respondents were able to select multiple answers; a breakdown is shown in Table 4. 63 respondents (75%) indicated that they are not consortium members; of the 21 (25%) who are, 10 share a LMS. 54 respondents (68%) were interested in the "e-Content Licensing Scheme integrated with a total Library Management and Services Platform" advocated by the SCONUL HEFCE Shared Services Study (Sero Consulting Ltd., 2009) and monitor developments, while 12 (15%) would actively consider

adopting such a system. Only 3 (4%) were not interested. The Registry system was the most common institutional system to interact with respondents' LMSs, as shown in Figure 4. The least was the Finance system, though this is the system most respondents would like to connect with their LMS (34, or 47%)

Figure 4 here

41 respondents (51%) use an API with their LMS, 27 (34%) do not, and the remainder were unsure. Reasons for not using an API are shown in Table 5; respondents could select multiple answers. 55 respondents (69%) currently use open source software in their library. More respondents reported preferring commercial software (14) than open source (9), though most (55) consider open source and commercial software equally.

Table 5 here

67 respondents (84%) were aware of open source LMSs, though only 21 (26%) have ever used one. Of those who have, most reported that the experience has not changed their opinion about adopting one. Forty two (52.5%) respondents thought their institution may adopt an open source LMS in the future; this compares to 39.1% in Adamson et al. (2008) as shown in Figure 5. Results were further analysed by the number of staff in respondents' libraries (Figure 6). Of interest is the comparatively high number (11) of respondents from libraries with under 10 staff who thought it unlikely that they would adopt an open source LMS.

Figure 5 here

Figure 6 here

Fifty eight (73%) respondents are observing open source LMS developments, compared with 76% in Adamson et al. (2008). While the 6% reporting to be engaged with developments is higher than the 4% in Adamson et al. (2008), a slightly higher number (21%) also reported not to be interested in open source LMS, as shown in Figure 7.

Figure 7 here

Forty eight respondents (61%) believe support from a third-party company could encourage them to move to an open source LMS, while only 26 (33%) believe third-party hosting would encourage such a move. Participants were asked for their views towards key issues surrounding open source LMSs. More than half (54%) agreed or strongly agreed that their institution lacked the staffing to support open source LMSs (Figure 8). 42% disagreed or strongly disagreed that the reputation of open source LMSs is as high as that of commercial equivalents. Only 17% agreed with this statement. 47% disagreed or strongly disagreed that open source LMSs did not fit with their current institutional purchasing procedures.

Figure 8 here

Responses to the statement "Open source LMSs do not fit with our current purchasing procedures" were further analysed by libraries following E.U. Invitation to Tender procedures, with little difference the breakdown of results (Figure 9), suggesting procurement processes may not be a barrier to open source LMS adoption.

Figure 9 here

No respondents strongly agreed or strongly disagreed that there is sufficient documentation to support open source LMSs. A majority (59%) were undecided, suggesting many may be unsure of the quality of documentation available. 47% disagreed or strongly disagreed that their institution lacked the technical expertise to maintain an open source LMS. A majority of respondents (60%) were concerned about maintaining local customisation of an open source LMS during upgrades, and a majority (77%) were undecided as to whether open source LMSs are sufficiently customised for the UK market. Most respondents (63%) agreed that they wouldn't want to be the first UK higher education library to adopt an open source LMS.

Respondents were asked to score how beneficial some commonly cited advantages of open source software would be, applied to a LMS, as illustrated in Figure 10. Free software cost was seen as most beneficial, with 41 respondents rating it the maximum score. Access to underlying data to improve interoperability was also considered beneficial although only 24 respondents rated the maximum score. The ability to download and test OSS and the existence of online development and support forums received very similar results. The greater adherence to open standards in OSS was considered beneficial by a majority of

respondents, though received the least number of maximum scores (16), and the highest number of "no strong opinion" scores, suggesting many are undecided as to how valuable this actually is. Independence from suppliers for selecting support and maintenance was given 19 maximum scores, though 3 respondents also rated this of no benefit.

Access to the source code to customise the software received the most number of "no benefit" scores (4), though these still represent a small minority of results. A relatively high number of respondents (21) believed this was extremely beneficial, however, and only 16 had no strong opinion, suggesting respondents have stronger views about this perceived advantage.

Figure 10

Interview Results

The interviews were analysed thematically together with qualitative comments from the questionnaire. The semi-structured nature of the interviews allowed separate questions to cover themes identified from the literature review, aiding this process.

Interviewees' experiences

Interviewees were asked when and where they first heard about open source LMSs. Two interviewees had first heard of open source LMSs in the last year, one interviewee five or six years ago, and the remainder in between. None had heard about open source LMSs from the same source; responses were from doing research, the library press and dealing with a support company. Participants were most familiar with Koha; three had tested it, and the remaining two had been to a demonstration. Koha was referred to when participants gave examples, which may not be reflective of other open source LMSs. As only 26% of questionnaire respondents had experience of an open source LMS, interviewees are more likely to be knowledgeable about the topic than the population as a whole.

Interviewees were asked how they felt open source LMSs compared to proprietary systems. Results were well aligned with interviewees' scores suggesting good internal validity. For example interviewee 1, the participant with the lowest score, gave the most negative opinion, stating that open source LMSs were "nowhere near as sophisticated" as proprietary LMSs.

Several interviewees expressed concern over the maturity of the back-end code to open source LMSs in comparison with commercial systems. Three cited the lack of an inter-library loan module as a disadvantage, and two criticised limited acquisitions functionality. One interviewee believed that acquisitions and serials are also handled poorly by proprietary systems. Interviewee 5 made a comparison between open source and current proprietary LMSs, when compared to emerging cloud-based systems: "Koha is a good example of the current... library systems... it isn't... a competitor to the sort of things that are starting to come on to the market like Ex Libris Alma." (Interviewee 5)

One interviewee believed the distinction between open source and proprietary LMSs to be unimportant: "You look for the software that will do the job you want it to do to the best that it can be done, and whether it's open source isn't necessarily at the top of the decision making process." (Interviewee 1)

Procurement and Cost

Asked about whether their institution will follow a formal procurement procedure for their next LMS, two noted that they would, however neither felt that this would impact on their ability to choose an open source LMS. One intended to ask a third-party company to demonstrate an open source LMS or appraise it themselves, "installing it and then demonstrating... in the same way as we get a supplier to demonstrate" (Interviewee 3). One interviewee noted that their institution followed a LMS planning cycle, which included an agreed period for changing systems. Another mentioned that they had no plans to move from their current supplier. Many interviewees did not believe open source LMSs to be financially advantageous due to the additional resources required, for example:

"People often equate open source to be free, and that's not true. You might not have to buy the code... but you probably have to spend more local time in actually installing and understanding what's going on... " (Interviewee 3)

One interviewee, however, had been able to implement the open source VuFind catalogue as no capital investment was required: "We were able to just go live with it, and... because there was no money involved we could just sort of put it up there, see if it worked, and if it did work... we could sort of develop it, and if it didn't, well nothing ventured, nothing lost" (Interviewee 5)

Pioneers

Most agreed that institutions were reluctant to be the first to move to an open source LMS because it was an unknown quantity, and the lack of a reference site was of concern. One also commented that although an advantage to open source "is the user group side of it... if there aren't any other equivalent users then you won't get any of that" (Interviewee 1). All interviewees believed that Staffordshire University's adoption of Koha could encourage others to investigate open source LMSs, though with the caveat that it may depend on their experience. One interviewee suggested that : "Some people might say, let's just give it a year and see how it goes... if it's good for them, then there will potentially be more buy in" (Interviewee 2), while another replied that: "What a lot of sites will look to do is see how they're doing... what they're publishing... whether they're actually holding any kind of conferences... that will give people the confidence to go back to their institutions and actually at least consider it" (Interviewee 3)

Support, hosting and interoperability

Though all interviewees currently host their LMS, all are also considering commercial hosting. This was seen as beneficial for saving staff time, particularly during upgrades and maintenance: "Updates are quite time consuming to do, with a lot of downtime and very often with very poor documentation." (Interviewee 3) This would allow staff more time to enhance their provision: "We can concentrate on the bits that are more sexy and glamorous - developing new functionality and integrating those services with other things." (Interviewee 5)

One interviewee with experience implementing VuFind was reluctant to opt for an open source LMS without support:

"We would certainly not have open source software for a system of that size that we didn't have support for from an external company... [VuFind] might be small enough for us to manage ourselves but anything bigger than that and we would definitely need to be able to have somebody to call on." (Interviewee 5)

Opinions were mixed as to whether a wider range of support companies would encourage institutions to choose open source LMSs. One interviewee thought this could provide greater flexibility if support was unsatisfactory, while another believed it useful because "from a risk assessment point of view if there is only that one company and that company folds then you're a bit on your own" (Interviewee 4). Conversely, quality rather than quantity was also

seen as important: “It doesn’t really matter how many companies there are, so long as there’s one that’s actually good and has a good reputation.” (Interviewee 1)

Interviewees were asked whether open source LMSs would offer greater interoperability with other institutional systems. Four believed they would, though one disagreed, and one noted that it would require technical investment. The greater adherence to standards in OSS was seen as an advantage:

"With open source when people are developing there is an obvious need... to actually make them compatible with existing standards... there is less drive for a commercial supplier to do so." (Interviewee 3)

Staffing

When asked whether they felt open source LMSs would take up more staff time and expertise than commercial systems all but one thought that more expertise may be required, but opinions varied as to the form this would take. Three felt that if the system was supported, open source and commercial LMSs would be similar, but that additional expertise would be needed to modify the base code of an open source system. One felt that additional expertise would be needed to negotiate prices for customised development of an open source LMS. No interviewees felt that additional staff time would be required for open source LMSs, but two felt that staffing may be used for development rather than support. A questionnaire respondent noted that, due to uncertain staffing levels within their institution, commercial software could be seen as a “safer option... because at least then if staff leave there is support for the system”. One interviewee thought that next generation cloud-based LMSs may offer time saving suggesting that:

“The interesting comparison is between those systems and this next generation and whether this next generation actually does mean that we can get away with less staff.” (Interviewee 5)

UK specific issues

Interviewees were asked what they thought were the differences between UK academic libraries and other libraries’ use of their LMS. Three noted the lack of consortia in the UK in comparison with other countries, such as the United States or Iceland. Two also mentioned the uniqueness of the UK inter-library loan system, where the British Library handles requests centrally. Interviewees were then asked whether these issues were addressed in their LMS, and the response was generally positive. Despite this, interviewees were unconcerned

that open source LMSs may not have local functionality. One thought that inter-library loans could be managed by a separate system, while another thought that the nature of open source software would allow this to be addressed: "I think the simple answer is that you go out and develop it! You get the community to develop it." (Interviewee 4)

Modification, forking and compatibility

Every interviewee expressed interest in making changes to the source code of an open source LMS, though three were concerned about the technical skills required. One who expressed reservation over the richness of open source LMSs thought development would be necessary:

"If we did embark upon open source as a LMS that would be a given, that it would be part of our buy into it as well, that we would be helping to shape and develop a product." (Interviewee 2)

Interviewees noted different changes that they would be interested in making. One noted development of acquisitions and inter-library loan functionality, another showed an interest in enhancing reporting capability, while a third thought developing interoperability with their Finance and Human Resources systems would be advantageous. All interviewees expressed concern over retaining compatibility during upgrades. One view was that the nature of university libraries would encourage forking:

"There's a tendency... in certain universities to consider themselves to be unique in the way that they approach things... to try and twist the system to do what the institution has always done... Often that means breaking the system or twisting the system and using it in a way that it's not really supposed to be used and putting in place all sorts of weird workarounds. I think the danger if you've got an open source system that is easy to modify... is that sort of tendency would blossom." (Interviewee 5)

Consortia and Community

Interviewees were undecided whether a move towards consortia would lead to greater adoption of open source LMSs. One did not anticipate a trend towards consortia, while another commented that their existing commercial supplier has experience in providing systems for consortia. One interviewee thought adoption of Evergreen, the open source LMS built for consortia, would be advantageous if such developments occurred.

Three interviewees cited the community development surrounding open source as beneficial, but disadvantages were also mentioned. One, noting experience with VuFind, was sceptical

about developer commitment when programming for personal enjoyment rather than commercial incentive:

"All it takes is a few changes in personnel or a few leading sites, the voices that you always see on the mailing list... to disappear or to get interested in other things and then you've got software that isn't going anywhere." (Interviewee 5)

Community support and development was also seen as mirroring the role of a commercial supplier's user group rather than an advantage specific to open source software.

Discussion

As most questionnaire respondents (84%) had heard of open source LMSs, it seems unlikely that their institutions have not chosen these systems simply because they are unaware of their existence. A majority of questionnaire respondents agreed they would not want to be the first UK higher education library to adopt an open source LMS. Interviews with systems librarians suggest the higher education community relies strongly on peer feedback, perhaps influenced by the academic world. This mirrors the views of Hoy and Koopman (2008, p. 57) and Adamson et al. (2008, p. 85), adding weight to the argument that academic libraries are more conservative and slower to adopt new systems than other libraries. If the results are representative of the sector as a whole, trailblazers will be needed for open source LMSs to become widely adopted. Now that Staffordshire University have chosen Koha, other libraries may be waiting to learn from their experience and for a peer support community to grow before considering open source LMSs. A further study in several years may reveal changes in opinion.

The similarities between the results of this research and those of Adamson et al. (2008) are striking. Attitudes towards involvement with open source LMSs do not seem to have changed significantly in the last three years, though any conclusion is limited given the questionnaire response rate. Despite these similarities, a slightly larger proportion of respondents in this study believe it possible they will adopt an open source LMS. This may be indicative of a shift in opinion, though may also be due to bias, with those enthusiastic about open source being perhaps more likely to complete the questionnaire.

The slow replacement cycle referred to by Adamson et al. (2008, p. 17) is reflected in the results, with very few LMSs purchased since 2004. As most respondents are satisfied with

their current system there may be little motivation for change, whether to an open source LMS or another proprietary system, especially given the expense and complexity of the migration process. Libraries may also be restricted to a long term planning cycle, and the high number of respondents who have no plans to change their LMS would suggest limited take-up of open source alternatives in the near future.

The results of this project suggest uncertain staffing levels within the sector may be a driver towards commercial support and hosting. This is perhaps unsurprising given the current financial constraints in higher education libraries. Although some respondents are considering open source LMSs, even the most enthusiastic are reluctant to do so without external support. One barrier to developing local functionality for the UK academic market is concern over retaining customisation during updates, and managing different versions to avoid forking should several libraries make changes. Every interviewee expressed both an interest in learning how to modify the source code of an open source LMS and a concern over how such modification may affect their ability to upgrade. Given the number of overseas Koha and Evergreen users it is questionable whether any local enhancements are likely to be accepted into the base code, even if UK academic libraries could co-operate and consolidate modifications into a single version or compatible add-ons. This may leave users in the sector with an outlier version, as Abram (2009) suggests. A solution to this issue may be the management of enhancements by a support company, especially since third-party maintenance is the preferred support option, who can attempt to bring local enhancements into the software code on behalf of the wider user community. This might lead to a situation as described by Hopkinson (2009), where libraries see little difference between commercial LMSs and supported open source LMSs, especially given the limited number of UK support companies available.

It is notable that the ability to customise the source code was not seen to be of benefit by as many respondents as the other advantages of open source LMSs cited in the questionnaire. This may be due to the time and knowledge required to make alterations. The questionnaire results suggest, among respondents at least, staff time is a greater barrier than technical expertise.

Concern in the literature over procurement processes stifling open source LMS adoption (Jaffe & Careaga, 2007; Chad, 2007) is not reflected in the results. Librarians enthusiastic about open source LMSs intend to include them in formal tendering procedures either

through a process of self-demonstration or by inviting tenders from third-party suppliers. This difference between the literature and the results may be explained by the lack of respondents interested in adopting an open source LMS without external support, as costs and credentials from a support company are likely to satisfy tender requirements. In this sense, findings seem to confirm Breeding's (2008a) claim that libraries are unlikely to switch from contracted maintenance to paying for local support.

The lack of specific functionality used by the sector, such as an inter-library loans module, does not seem to be a significant factor in discouraging participants from interest in open source LMSs. Interviewees seemed willing to either develop local customisation or use additional external systems to replace lost functionality. Existing functionality in proprietary systems may also be unsuited to the UK market, and the ability to customise open source LMSs could represent an opportunity to develop systems tailored towards the sector. Given the limited scope of the study, caution must be taken when making this generalisation and this may be an interesting area for future research.

The inadequate functionality reported in the study generally matched well with Hughes' (2010) examination; inter-library loans, serials and acquisitions were noted by participants in this respect, though no concerns were reported over circulation functionality which Hughes identifies as having nine category "D" failures against the UK Core Specification document. This difference may be due to participants being more familiar with Koha than Evergreen, the subject of Hughes' study. Statistical reporting is an area worth considering for development as identified by one interviewee; Hughes (2011) notes that Evergreen does not provide pre-defined reports to meet SCONUL requirements however it would "appear to be fairly straightforward for [a] competent [systems administrator] to add" (p.37), and the nature of open source systems may allow changes to be made to facilitate sector-specific reporting needs. While results do reflect the need for interoperability referred to in the literature (e.g. Kinner & Rigda, 2009), many of respondents' LMSs already interact with other relevant systems. Given the number of systems already interoperating and the development of APIs in commercial LMSs, it is debatable whether interoperability is enough of a driver to encourage libraries to choose open source LMSs.

Good quality documentation is essential to the success of open source (e.g. Schneider, 2009). Most respondents seemed unsure of the documentation available for open source LMSs, which may be less crucial given that even the most enthusiastic interviewees seemed unlikely

to consider adopting one without third-party assistance. Support companies may be required to develop documentation as part of their contract, which could help to narrow any gap between the quality of documentation for proprietary and open source LMSs. One questionnaire respondent commented: "I don't think there's enough documentation on open source LMSs, but our provider doesn't produce sufficient documentation on a lot of aspects of their LMS either."

This may only be one opinion about a single vendor, but hints at the possibility there may not be a large gap in the quality of documentation between proprietary and open source LMSs. One unexpected result is the high proportion of respondents from libraries with less than ten staff who thought it unlikely they would adopt an open source LMS. This was not identified in the literature and, conversely, it could be argued that due to OSS being freely available, smaller institutions may be more likely to consider it. Respondents from libraries with less than ten staff did not answer differently to other groups when asked whether their library lacked the staffing to maintain an open source LMS suggesting that, if such a connection exists, it may be due to more complex reasons than simply the time or technical ability of systems librarians at small institutions. Further research may help to clarify whether this is finding is repeated across the sector, and reveal the reasons for it.

It is worth noting that all participants who commented on their experience with an open source LMS referred to Koha. Little was mentioned about any other open source LMSs, with the exception of several references to Evergreen in relation to consortia. It is therefore worth considering whether experience of Koha is colouring attitudes towards open source LMSs in general, and whether some concerns raised are not reflective of the open source LMS market as a whole. For example, Helling, advocating Evergreen, reports that:

"Evergreen has been far less buggy and far more reliable than Koha. Evergreen has also not had to face a 'fork' in its code in the way that Koha users have... Serials and Acquisitions modules are also expected to appear for Evergreen... making Evergreen much more appealing to larger systems and academic libraries" (2010, p. 706).

While Helling's view represents just one opinion, it is worth considering whether the increasing publicity surrounding Evergreen and associated reports in the literature (e.g. Longwell, 2010; Molyneux, 2009; Helling, 2010) will influence the attitudes of those currently sceptical about Koha.

Conclusions

Despite the interest in Software-as-a-Service (SaaS) identified by Breeding (2009a), no participants in this study, which may represent almost half the sector, reported using it. Interviewees' comments about SaaS were all positive; the only reason given for the lack of adoption to date was a concern over hosted data ownership. Perhaps another explanation is the recent decline in the purchase of new LMSs, with system migration being a logical time to change hosting arrangements. If the enthusiasm shown in this study is reflective of the general population, it will only be a matter of time before UK academic libraries start to outsource their hosting to commercial vendors. This may help to close the gap between proprietary and open source systems (Breeding, 2008a), and provide a more equitable platform for a consortium purchase, as proposed by Adamson et al. (2008), with no individual institution having to take a lead by hosting the system.

There was general agreement among interviewees that open source LMSs could benefit consortia, though only 10 respondents reported sharing an LMS in this fashion. Given the references made to Evergreen in the context of consortia, any future partnerships among UK academic libraries may result in more interest in this LMS; this may be because Evergreen was developed for this purpose rather than because it is open source. Hughes (2011) claims that lessons can be learned from the Evergreen community in forming constructive partnerships, with the open source model promoting a "let's work out exactly what we want, then we can make it happen" attitude over a "someone has to fix this" standpoint. This aligns with the view of interviewees that open source may be of benefit in a collaborative environment although, despite a government agenda that favours consortia, interviews did not reveal any intention to move in this direction at present.

The results of this study suggest that open source LMSs are unlikely to be widely adopted in participants' libraries in the near future. The academic community is traditionally conservative in implementing new library technology, and this could be explained by a need for peer feedback. When combined with the lack of motivation to change systems and the current financial climate, which may be causing libraries to choose commercial solutions rather than rely on support staff, this could explain the current reluctance to adopt open source LMSs within the sector. Despite this, the research has revealed enthusiasm towards the open source model, and if Staffordshire University and other pioneers report positive experiences there may be a move towards these systems in the longer term.

SaaS hosting may just hint at a longer term future where libraries look to new, cloud-based LMSs, which present a whole new licensing model. Existing open source systems mirror current large scale library systems, based on established process (Adamson et al., 2008): future cloud-based LMSs may be based on open source components, as suggested by Adamson et al. (2008), but this may lead to a hosted implementation which is "fiercely proprietary" and allows the subscriber no access to the server in order to modify the base code since the binary software is not itself being distributed (O'Reilly, 2005, p. 466).

The library management system is currently at a pivotal point in its history. The large, monolithic proprietary systems slowly refined over the last few decades are becoming increasingly distant from the way modern academic libraries function as the focus shifts from printed to online resources. Open source LMSs represent an alternative and may allow universities to develop a system better suited to local practices, however UK higher education has yet to take advantage of these systems. Current open source LMSs based on existing proprietary products may be superseded by cloud-based systems designed to manage both print and electronic resources. University libraries will need to keep a close eye on developments to ensure effective use of their systems budget and keep customers satisfied in the increasingly demanding academic sector.

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Tables and Figures

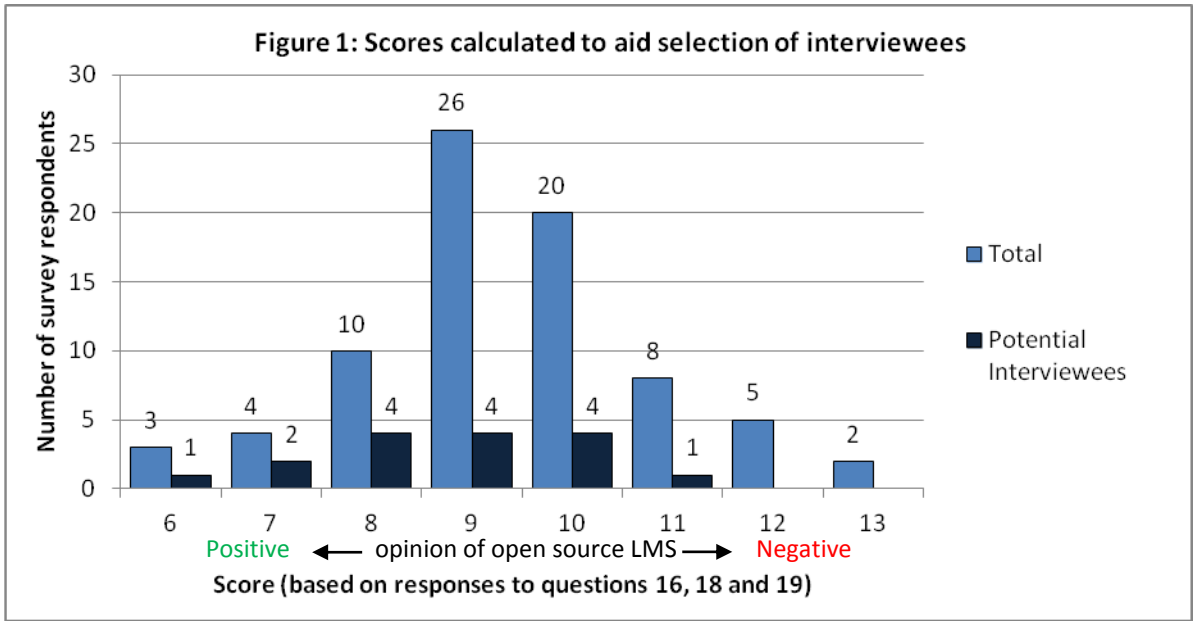
Table 1: Themes in the literature

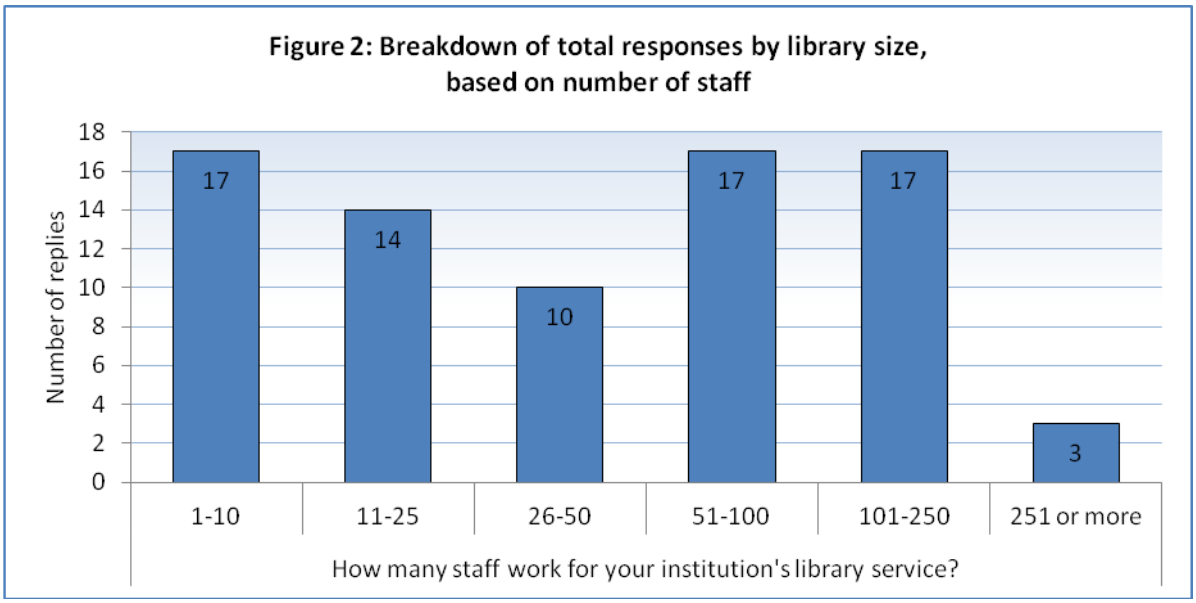
Theme	Source
Synergy OSS/libraries	e.g. Chudnov, 1999, Caldwell, 2007, Chad, 2007, Jaffe & Careaga, 2007, Tedd 2007, Bissels, 2008, Krishnamurthy, 2008, Rhyno, 2008, Rafiq, 2009
Procurement process barriers	e.g. Chad, 2007, Jaffe and Careaga, 2007, Adamson et al, 2008, Breeding, 2008a, Pace, 2009
Commercial support issues	e.g. Breeding, 2002, Adamson et al. 2008, Breeding, 2008, Hopkinson, 2009,
Coding and documentation	e.g. Abram, 2009, Hopkinson, 2009, Schneider, 2009
Interoperability	e.g. Breeding, 2007b, Kinner & Rigda, 2009, Ruschoff, 2008, Pace 2009, Hughes, 2010

Table 2: Demographic characteristics of interviewees

	Interviewee	**Type of institution**	**Position in library**	**First heard of open source LMS**	**Opinion on open source LMS**	**Interest in making changes to the source code?**
	Interviewee 1	Higher education college	Senior Librarian	About a year ago	" nowhere near as sophisticated" (as proprietary systems)	No, but would consider training
	Interviewee 2	New university	Library Systems Manager	In the last year	"lacking significant functionality", not "as rich as what we currently use"	Yes – " we would have to make quite a few changes"
	Interviewee 3	Plate glass university	Library Systems Manager	4 years ago	"not quite as advanced as some of the commercial systems yet"	" we are familiar with tweaking code - we

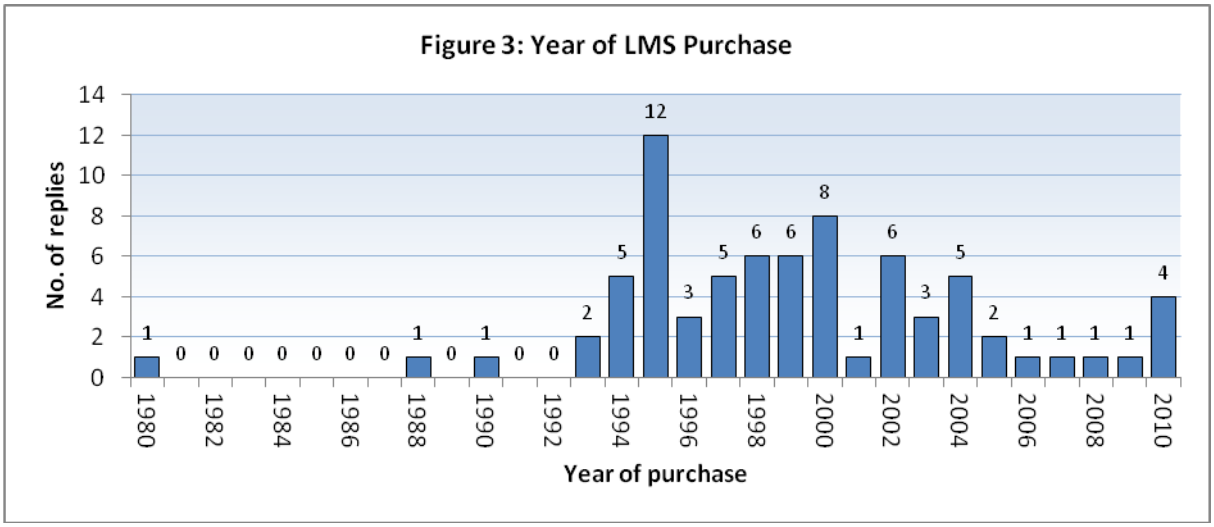
						often do”
	Interviewee 4	Post-2000 university	Deputy Librarian	2 – 3 years ago	“didn’t quite have all the functionality that our current system has...” otherwise “quite impressed”	Yes - “if it was needed for a particular reason”
	Interviewee 5	Pre-1900 university	Library Manager	5 or 6 years ago	(Koha seems to be a) “ perfectly decent solid dependable large monolithic (LMS)”	Yes – “if we had the technical resource”





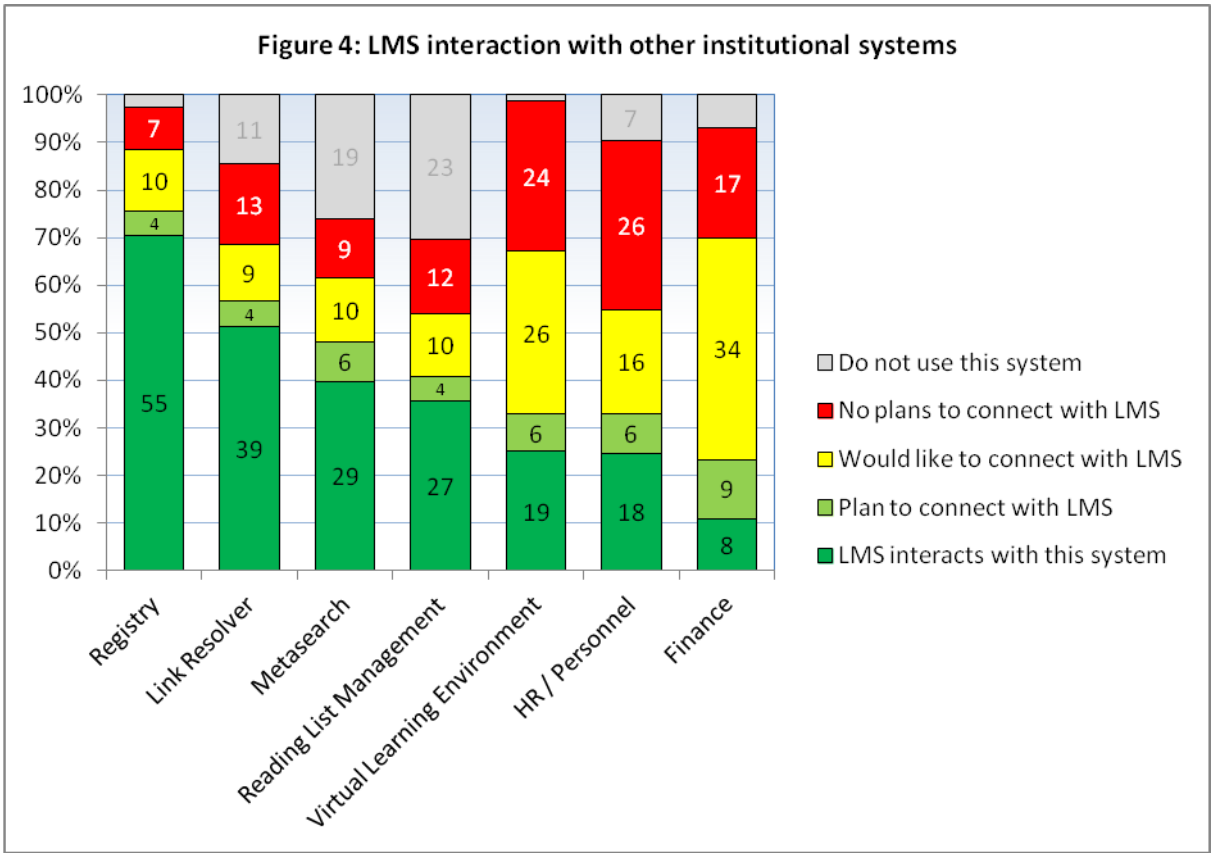
	Frequency	Percent	Adamson et al. %
Talis	22	26.2%	22.8%
SirsiDynix	21	25.0%	22.8%
Innovative	16	19.0%	17.9%
Ex Libris	10	11.9%	23.4%
IS Oxford	6	7.1%	3.3%
OCLC	3	3.6%	1.6%
Softlink	3	3.6%	0.5%
Infor	2	2.4%	1.6%
Other	1	1.2%	6.1%

Table 3: Current LMS Suppliers



Department	Frequency	Percent
Library	78	91.7%
IT	29	34.5%
Senior Management	16	17.9%
Finance / Procurement	11	13.1%
Partner Institution	1	1.2%
Library User Committee	1	1.2%
Hosting Institution	1	1.2%
Education Department	1	1.2%
Academics	1	1.2%

Table 4: Departments involved in LMS selection



Reason	Frequency
Don't know what an API does	8
No current need	7
Lack of technical knowledge	6
Licence is too expensive	5
Not available with current LMS	3
Other	2

Table 5: Reasons for not using an API

Figure 5: Likelihood of open source LMS adoption

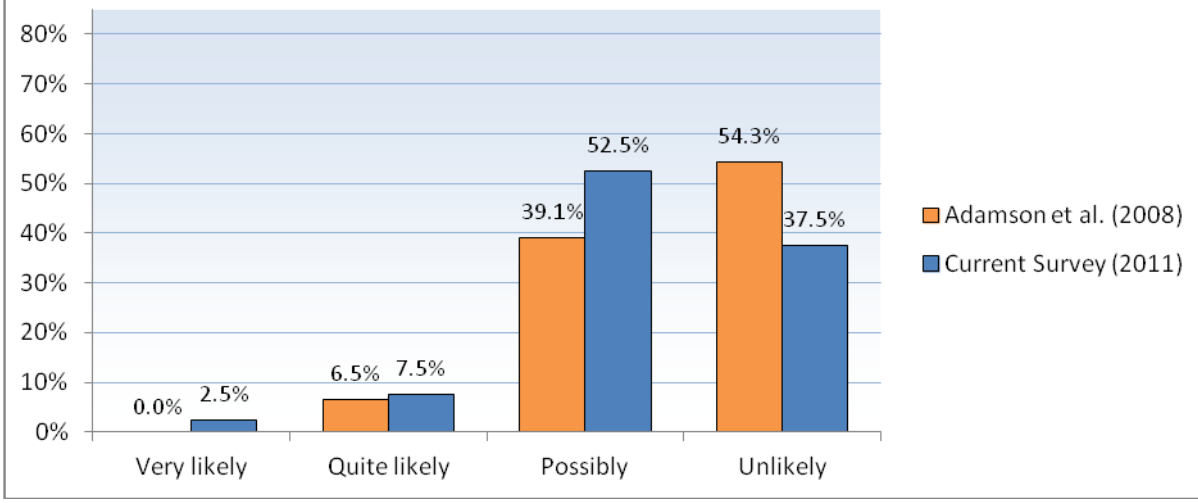


Figure 6: Likelihood of adopting open source LMS, by size of institutional library service

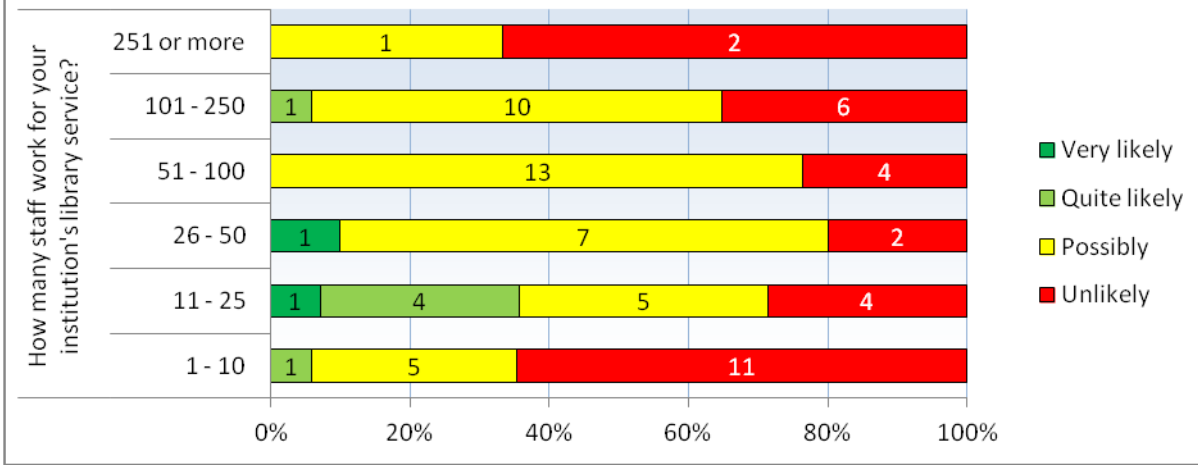


Figure 7: Involvement and interest in open source LMS

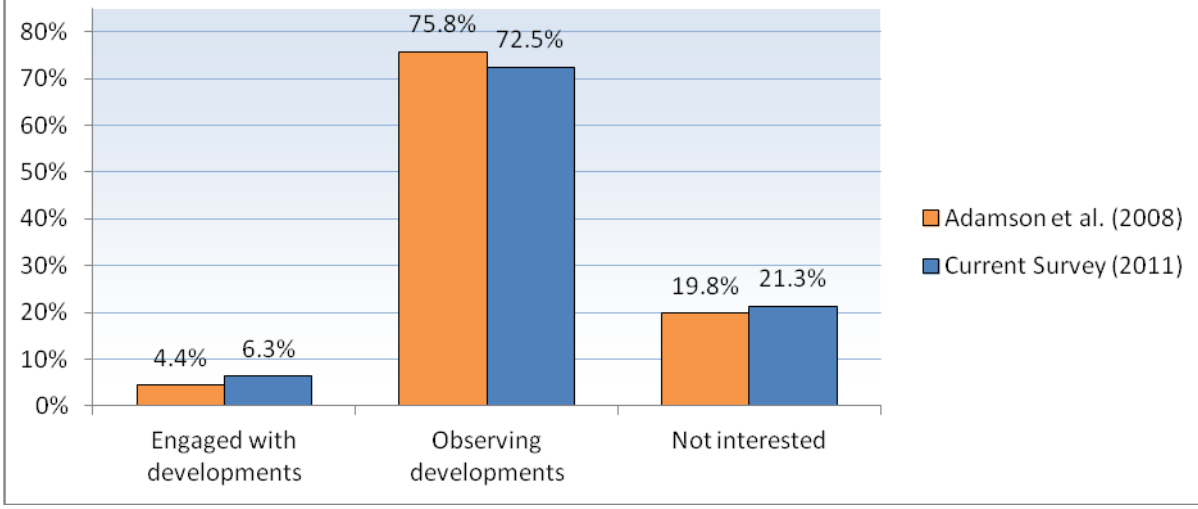


Figure 8: Attitudes towards key issues surrounding open source LMS

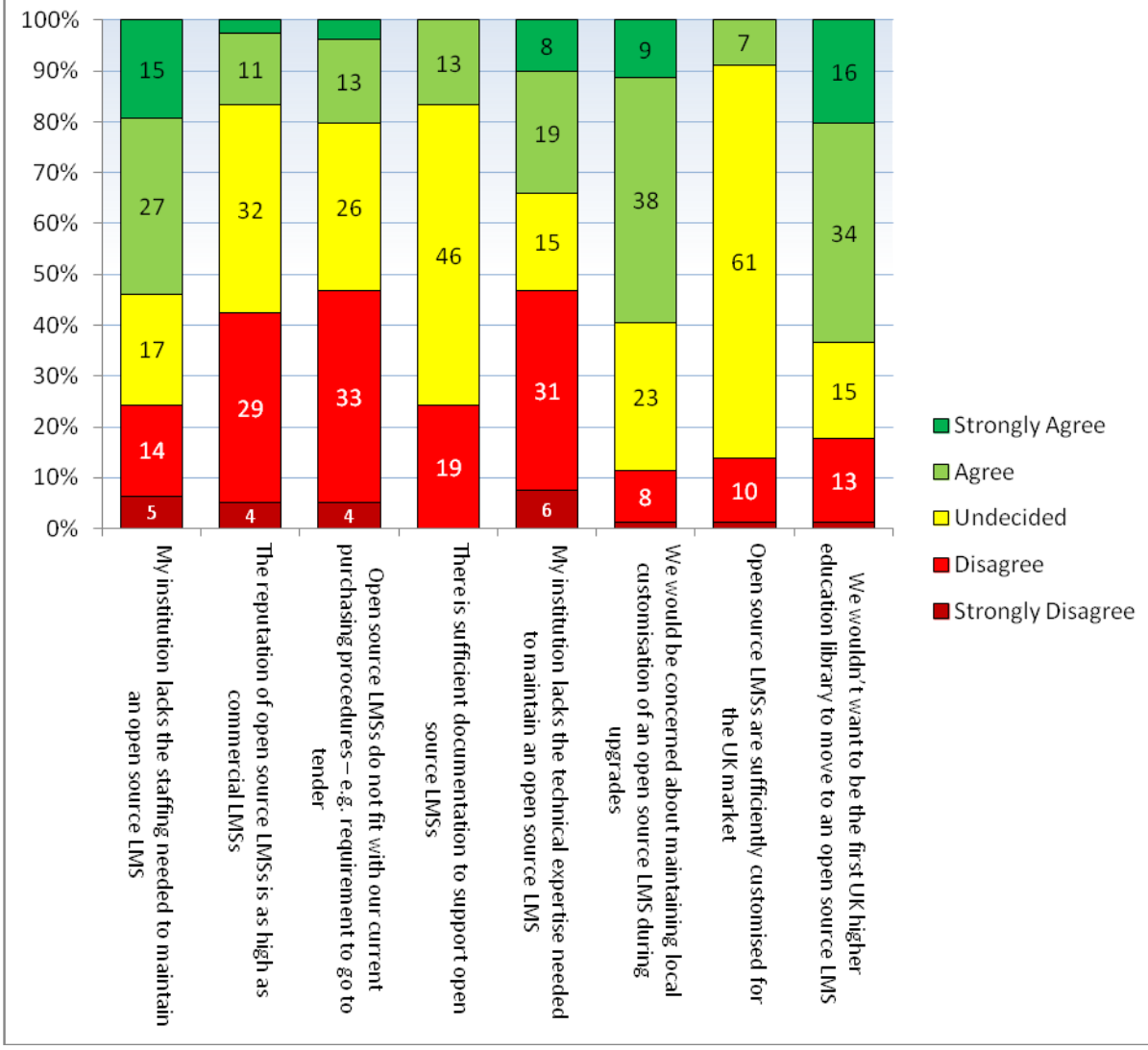


Figure 9: Responses to "Open source LMSs do not fit with our current purchasing procedures" by libraries using E.U. Invitation to Tender

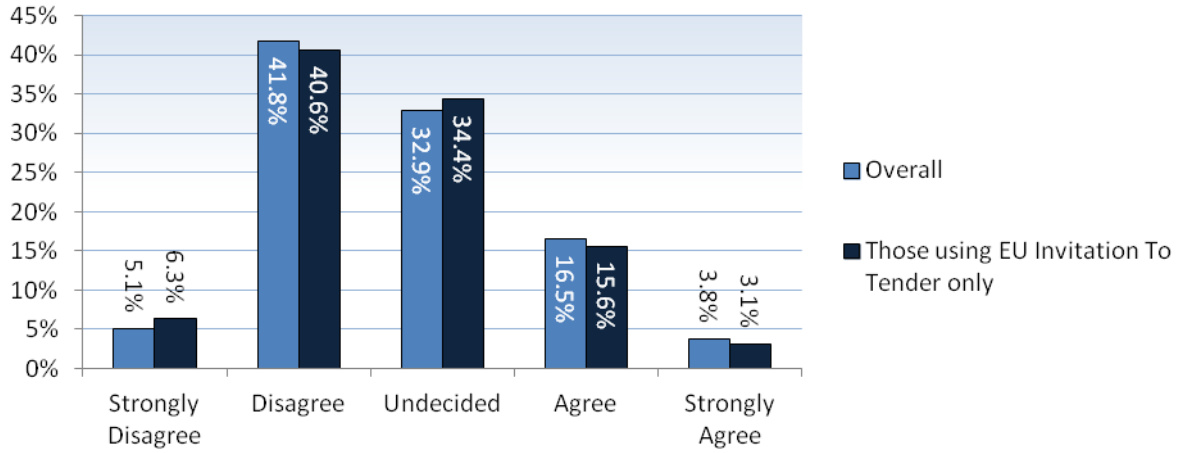


Figure 10: Attitudes towards commonly cited advantages to open source software, applied to LMSs