

Best Practices in Open Source in Higher Education Study

The State of Open Source Software

by Rob Abel
March 1, 2006



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This report is the first of a series. It provides an overview of the use and attitudes toward open source software in higher education. Follow-up reports will provide details on best practices for implementing open source solutions. For more information go to http://www.a-hec.org/open_source.html

Citation

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Open Source in Higher Education Study

The State of Open Source Software

Conclusions Regarding the Higher Education Market

- All segments of the U.S. higher education IT market are expressing significant interest in open source software products. Open source is gaining mindshare from four directions: spillover from commercial open source initiatives (such as Linux, Apache, OpenOffice), grant-funded open source initiatives in higher education specific application areas (course management, portal, financial systems, student portfolios), market-driven open source initiatives in higher education specific application areas (course management), and open source compatible higher education specific applications (course management, portal). Two-thirds of CIOs have considered or are actively considering open source with a leading edge of about 25% of all institutions actively engaged in implementing higher education specific open source applications of some type.
- The business drivers for open source applications in higher education favor traditional non-open source product providers if they are responsive to buyers concerns. From the buyer side the value proposition for open source applications can be summarized as a combination of cost, control, and the possibility for innovation. The uncertainty in the commercial market being able to provide the higher education specific products in emerging critical areas such as course management and portal in a stable, predictable, and affordable manner trump any specific gains in functionality being sought. Thus, the challenge for open source initiatives is to create the perception and assurance of greater stability. That can only happen if there is a very large shift of industry financial resources from non-open source products to open source. Despite much enthusiasm for open source there are no signs that a large shift is occurring at this time. The opportunity for commercial services surrounding open source applications in higher education is currently limited to small consulting and implementation efforts.
- The strategies of open source compatible products from commercial vendors or the use of standards-based open computing to integrate open source and non-open source products represent win-win propositions for the industry. This strategy achieves a coupling of resources that helps to achieve the stability, predictability, and affordability the market is looking for and enables innovation from numerous sources. The question is can the diverse cultures of commercial companies, open source developers, and higher education institutions work together effectively to create an environment where commercial and open source products are compatible? The standards for

interoperability of products are much more mature and proven in the infrastructure world of operating systems, databases, and web servers than exists with respect to higher education specific applications. Development and pervasive adoption of learning application standards that enable cross-industry return on investment will probably become a critical success factor.

Summary Table of Open Source Adoption in Higher Education	
Parameter	Study Results as of February 1, 2006
	Note: Percentages shown are estimates of the percentage of all U.S. institutions.
Implementation of open source infrastructure products	57%
Leading open source infrastructure products	Apache (53%), Linux (51%), MySQL (38%), Firefox (35%), and Tomcat (33%)
Open source infrastructure products replaced or considered for replacement [†]	Web server (44%), operating system (34%), web browser (33%), database (32%)
Open source infrastructure product vendors replaced or considered for replacement [†]	Microsoft (35%), homegrown software (17%), Sun Microsystems (13%), Netscape (11%), and Oracle (10%)
Implementation of open source or open source compatible application products	25%
Leading open source application or open source compatible application products	uPortal (7%), OpenOffice (6%), SCT Luminis Platform (6%), Moodle (5%), Sakai (4%), Unicon Academus (3%), and OSPI (2%).

Summary Table of Open Source Adoption in Higher Education	
Parameter	Study Results as of February 1, 2006
	Note: Percentages shown are estimates of the percentage of all U.S. institutions.
Leading open source application areas	Portal (15%), course management system (9%), desktop office applications (6%), student portfolio (2%).
Applications replaced or considered for replacement by open source or open source compatible products [†]	Course management system (35%), portal (26%), content management system (23%), and desktop application(s) (16%)
Application vendors replaced or considered for replacement by open source or open source compatible products [†]	Microsoft (19%), Blackboard (17%), WebCT (16%), and homegrown software (15%)
Open source or open source compatible applications being most considered right now	Sakai (28%), Moodle (23%), uPortal (20%), OpenOffice (15%), OSPI (12%), OKI (10%), SCT Luminis Platform (9%), and Kualii (8%),
Perceptions of which open source or open source compatible applications are viable today	uPortal (29%), SCT Luminis Platform (29%), OpenOffice (21%), Moodle (19%), Sakai (13%), Unicon Academus (9%), and OSPI (7%)
Open source evaluation strong points	<ul style="list-style-type: none"> ▪ Total cost of ownership ▪ Integration with the campus infrastructure ▪ Functionality difference ▪ Security

Summary Table of Open Source Adoption in Higher Education	
Parameter	Study Results as of February 1, 2006
	Note: Percentages shown are estimates of the percentage of all U.S. institutions.
Is there a Total Cost of Ownership advantage to open source applications?	<ul style="list-style-type: none"> ▪ Advantage (56%) ▪ Neutral (27%) ▪ Disadvantage (7%) ▪ Can't tell (10%)
Open source evaluation weak points	<ul style="list-style-type: none"> ▪ People skills required ▪ Commercial support ▪ Level of product maturity
Percent of institutions that have not yet given serious consideration to open source	32%
Top reasons why open source has not yet been seriously considered	<ul style="list-style-type: none"> ▪ Lacking the resources to implement ▪ An unclear future for open source in higher education ▪ Satisfaction with current non-open source products (and therefore no reason to change) ▪ The costs are not clear

†It is important to note that estimates of replacement applications and vendors did not attempt to normalize for market share. Therefore in some sense those products and vendors with higher market share were 'penalized' because the prevalence in the market made them more likely to be replaced.

Survey Description

The respondents of the survey to date are more than 200 CIOs or others responsible for the consideration of open source software at U.S. higher education institutions. The respondents are spread evenly across all types of institutions in terms of Carnegie classification and operating budget.

[More on the Institution Representation Distribution . . .](#)

Executive Summary Points

- Non-higher education specific open source software has not only made it to the radar screen of U.S. higher education institutions but it has achieved implementations in a majority of institutions. This study estimates that 57% of all institutions have implemented some form of open source infrastructure software (operating systems, web servers, databases, etc.) and 34% of all institutions have implemented some form of open source or open source compatible application software (portal, course management system, desktop office applications, etc.).

[More on the Adoption of Open Source Software in General . . .](#)

- Open source or open source compatible application software of some form has achieved an estimated adoption to implementation status in 25% of U.S. higher education institutions. The leading open source or open source compatible applications are portal (3 products for 15% adoption), course management system (2 products for 9% adoption), desktop office applications (1 product for 6% adoption), and student portfolio software (1 product for 2% adoption). Specific product adoption levels are uPortal (7%), OpenOffice (6%), SCT Luminis Platform (6%), Moodle (5%), Sakai (4%), Unicon Academus (3%), and OSPI (2%). Of the 57% of the market adopting open source infrastructure software the products with top adoption are Apache (53%), Linux (51%), MySQL (38%), Firefox (35%), and Tomcat (33%).

[More on the Adoption of Specific Open Source Software Products . . .](#)

- Approximately one-third of the market (32%) has not yet given serious consideration to open source. This group is heavily weighted toward the smaller institutions. 74% of this group had operating budgets less than \$100 million.

[More on the Hurdles to Serious Consideration of Open Source . . .](#)

- Of those that have not yet given serious consideration to open source the most important factors were lacking the resources to implement, an unclear future for open source in higher education, satisfaction with current non-open source products (and therefore no reason to change), and the costs are not clear.

[More on the Hurdles to Serious Consideration of Open Source . . .](#)

- This study did not attempt to measure the specific degree of market share or revenue displacement caused by open source to non-open source software providers. In the case of infrastructure software it is probably a safe assumption that this will mirror what has occurred in other segments. For infrastructure software (operating systems, database, web servers, browsers, etc.) 35% are considering replacing Microsoft, 17% are considering replacing homegrown software, 13% are considering replacing Sun Microsystems, 11% are considering replacing Netscape, and 10% are considering replacing Oracle. For application software (course management systems, portals, desktop applications, etc.), 19% of all respondents are considering replacement of Microsoft, 17% are considering replacement of Blackboard, 16% are considering replacement of WebCT, and 15% are considering replacing homegrown software.

[More on the Candidates for Replacement . . .](#)

- Attitudes about the future of open source and open source compatible applications in higher education are positive across all institution types and operating budgets, with large public institutions most positive. The predictions for usage of open source or open source compatible applications is roughly equivalent to the prediction for infrastructure despite the more predominate presence of open source infrastructure today. 26% of all respondents believe open source application presence in their institutions will be substantial in three years. This percentage jumps to 55% for those who have already implemented an open source or open source compatible application and 69% for those consider open source initiatives as higher priority among all IT initiatives.

[More on the Attitudes About the Future of Open Source Applications . . .](#)

- Those areas that are predicted to be primarily implemented via open source software at the respondent's institution in three years are web server, campus portal, operating system, authentication, course management, ePortfolio, and quizzing. Those areas viewed as unlikely to be primarily implemented through open source in three years are the financial system, the student information system, and the phone/PBX system.

[More on the Applications Deemed Likely to be Implemented Primarily Through Open Source in Three Years . . .](#)

- The larger institutions have dominated the grant-funded initiatives (uPortal, Sakai, Quali). But, there has been some spread to the lower operating budget institutions now as well, many times in conjunction with a non-open source product that is "open source compatible". In addition Moodle, a market-driven open source alternative in course management systems, has emerged. It appears that Moodle has captured significant interest from lower operating

budget efforts but is making its way into some larger institutions. This is similar to the way that true market-driven open source efforts (such as Linux, Apache, etc.) achieve adoption in the lower end of the commercial market and gained significant market share there before moving into the enterprise.

[More on the Adoption Characteristics of Select Open Source or Open Source Compatible Application Products . . .](#)

- Among all respondents the select open source or open source compatible application products that were perceived as most viable today are, in order of most viable uPortal (29%), SCT Luminis Platform (29%), OpenOffice (21%), Moodle (19%), Sakai (13%), Unicon Academus (9%), OSPI (7%), and OKI (3%).

[More on the Adoption Characteristics of Select Open Source Application Products . . .](#)

- Open source initiatives appear to be primarily of average priority and IT-driven at the majority of institutions. Only 30% indicate influence from outside of IT in the movement toward open source. Of those indicating outside influence only 16% indicate influence from the executive level. The primary outside influencers are faculty leaders followed by department heads.

[Read more on Organizational Influences on Open Source . . .](#)

- Overall the business drivers most cited for considering open source are cost (total cost of ownership), control (avoiding commercial vendor lock-in), and the opportunity for innovation (customization) against a backdrop of the perception of unique requirements for higher education applications. 56% of those who have implemented or evaluated open source or open source compatible applications believe there is a total cost of ownership advantage vs. only 7% who believe there is a total cost of ownership disadvantage.

[Read more on Business Drivers for Open Source . . .](#)

- Of those who have implemented open source application products the areas in which they feel they have been most successful are user satisfaction, creating a platform for innovation, responsiveness to institutional needs, enhanced functionality, and total cost of ownership.

[Read more on Successes of Open Source Application Products . . .](#)

- The influence of commercial vendors on the growth of open source applications in higher education will be a key factor. 56% of all respondents agreed that their institution is more likely to adopt open source if backed by a commercial vendor versus only 11% who saw this as a negative factor. Of those who did not think it was too early to speculate, two to one believed they would work with a commercial vendor in some capacity vs. only with the open source group.

[Read more on Influence of Commercial Vendors on Open Source . . .](#)

- While impossible to gauge for sure the current market for services in conjunction with open source applications appears to be too fragmented and non-recurring to represent a significant opportunity. About 25% of the market is seeking some outside help with open source but this is distributed among some ten initiatives. uPortal, Sakai, SCT Luminis Platform, and Moodle are those most in need of external services with implementation, product support, and customization the most needed services. The ongoing services of end-user support and hosting were the least sought after.
[Read more on the Market for Open Source Services . . .](#)

Respondent Characterization

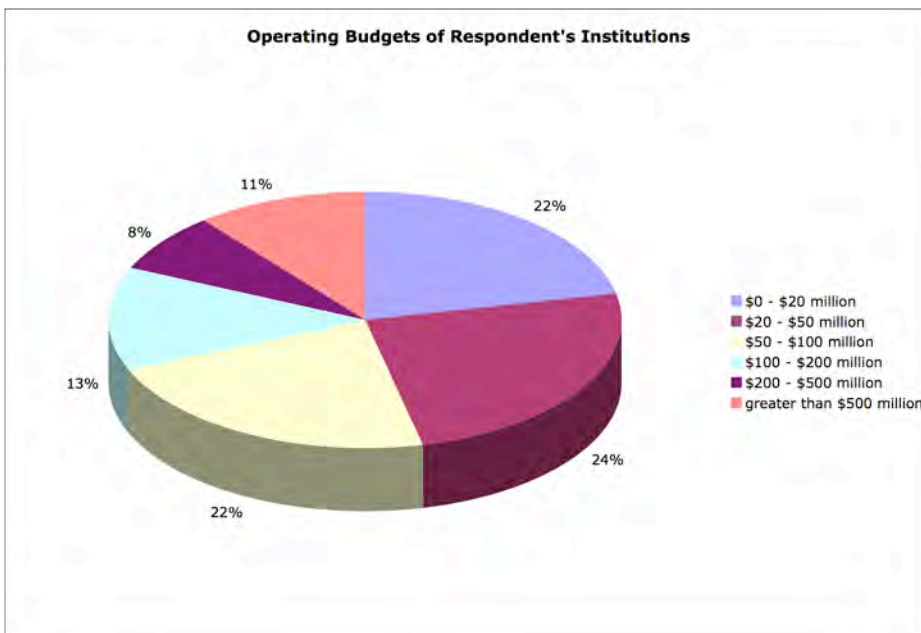
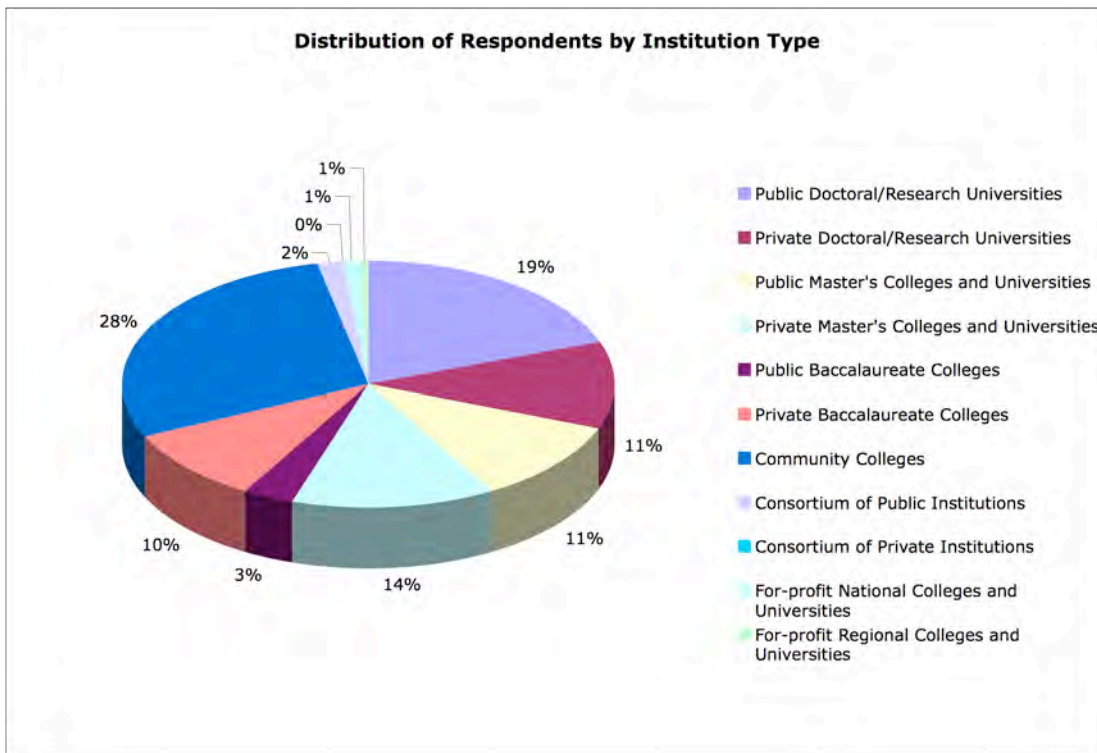
195 surveys were completed with partial completions from approximately 30 other participants. The respondents qualified themselves by answering a question that determined whether they were explicitly involved in the evaluation or decision making in their institution with respect to open source software. Respondents were also required to enter their institutional responsibility and contact information. Several hundred potential respondents viewed the survey that were not qualified respondents.

Institution Representation Distribution

A reasonable distribution of institution types are represented in the sample of respondents as compared to the higher education industry at large.

- 35% of the respondents represent public 4-year or higher institutions. Public 4-year or higher institutions make up 15% of the institutions and serve 39% of the students in the market.
- 35% of the respondents represent private nonprofit 4-year or higher institutions. Private nonprofit 4-year or higher institutions make up 37% of the institutions and serve 19% of the students in the market.
- 28% of the respondents represent community colleges. Community colleges represent 26% of the institutions and serve 38% of the students in the market.
- 2% of the respondents represent for-profit institutions. For-profit institutions make up 19% of the institutions and serve 5% of the students in the market.
- Private nonprofit 2-year colleges are not represented in the sample. These make up 3% of the institutions and serve less than 1% of the students in the market.
- 22% of the respondents represent operating budgets below \$20 million. While these institutions represent roughly 60% of the institutions in the market they have substantially less resource base with which to implement open source solutions and it can be expected that participation in this research would be less compelling.
- 46% of the respondents represent operating budgets between \$20-\$100 million. These institutions represent 30% of the institutions in the market.

- 32% of the respondents represent operating budgets greater than \$100 million with 19% greater than \$200 million. These groups represent roughly 10% and 7% of the institutions in the market respectively.

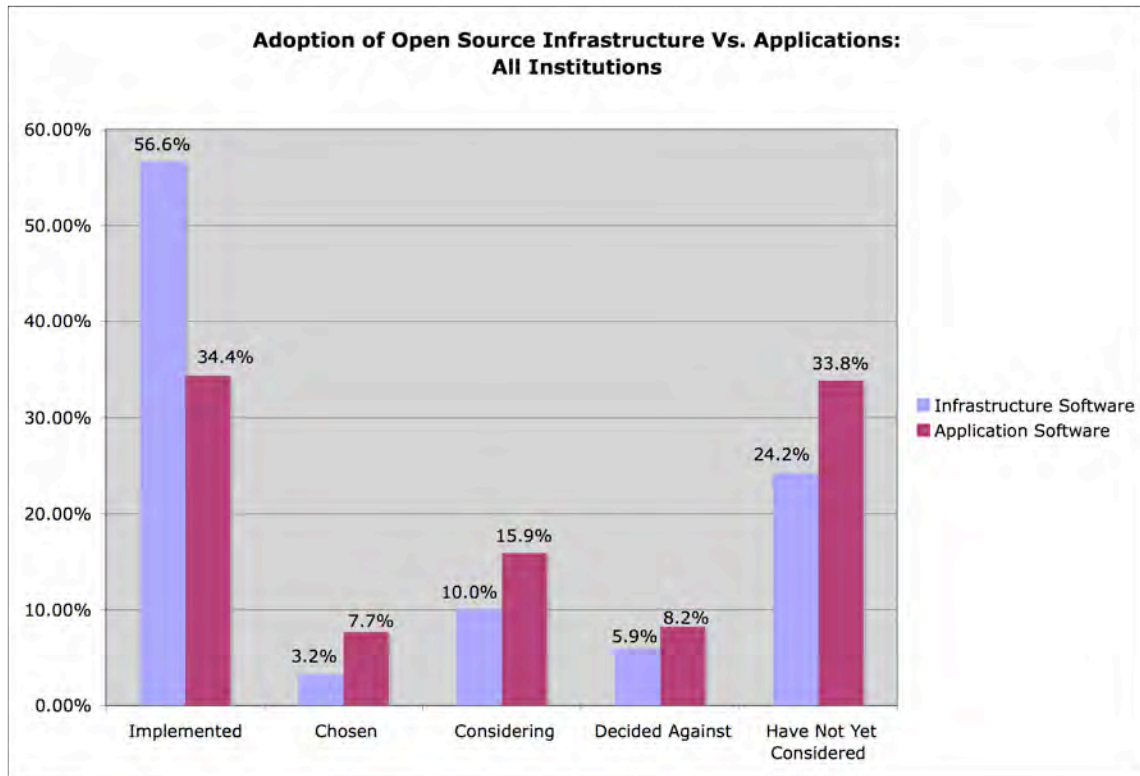


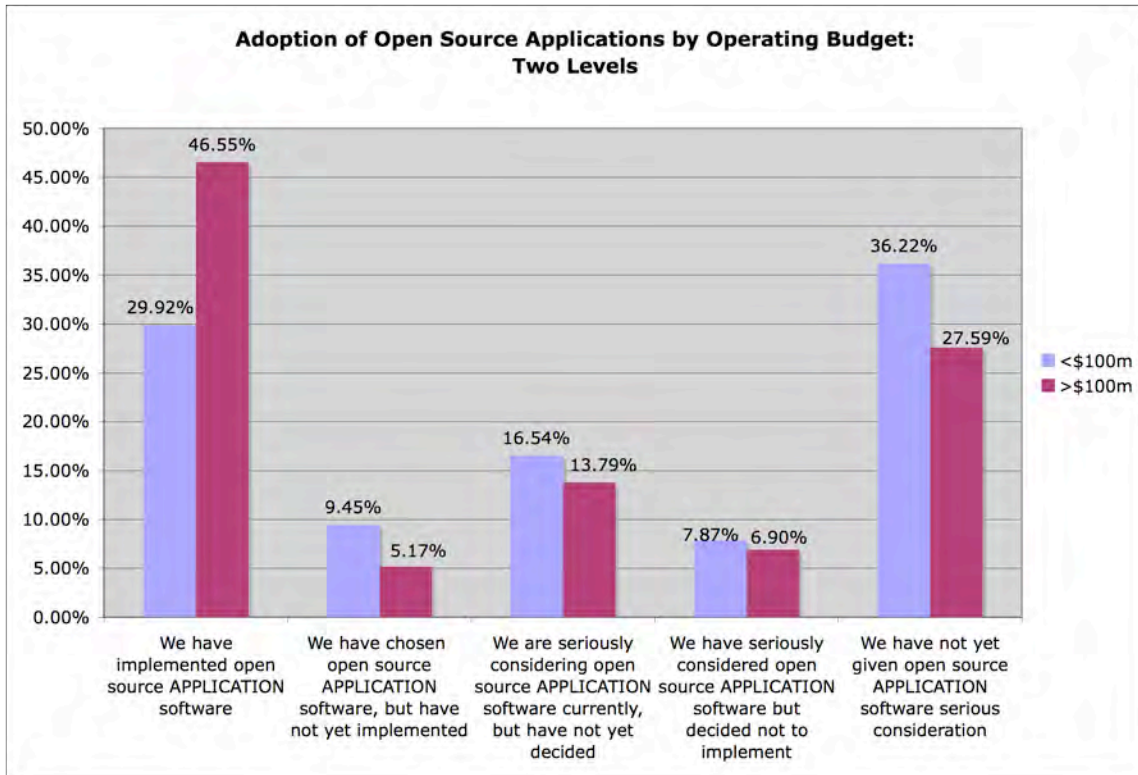
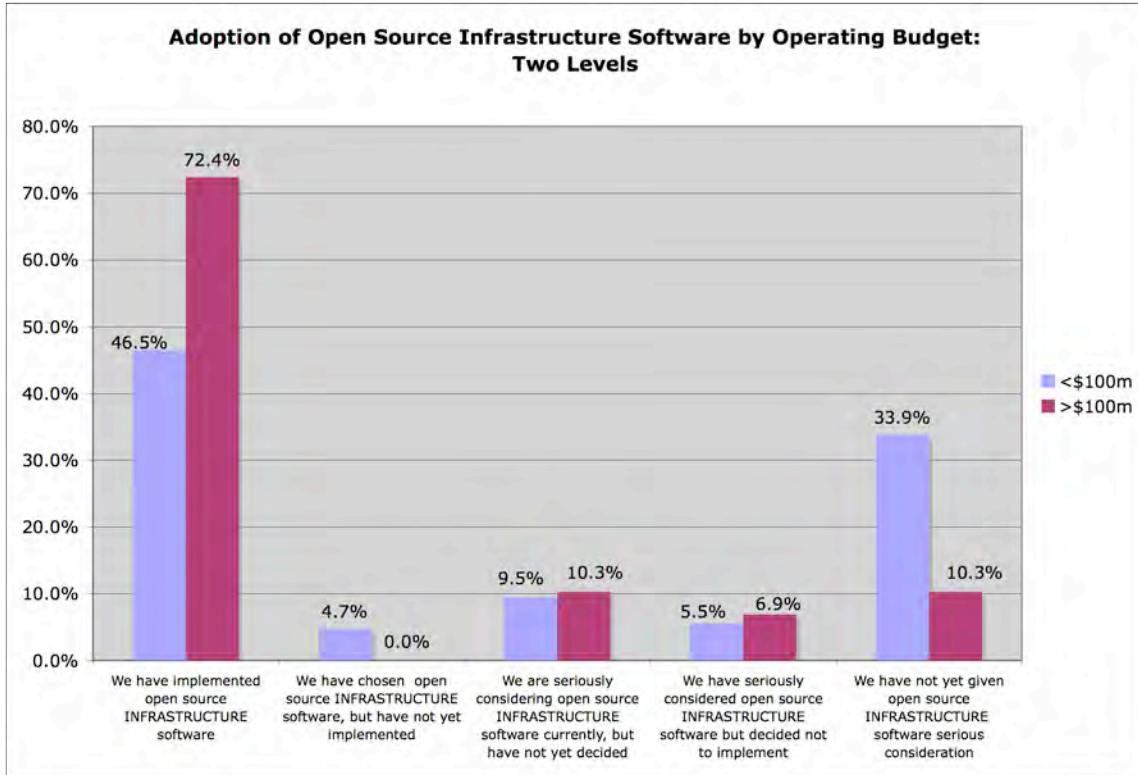
Adoption of Open Source Software in General

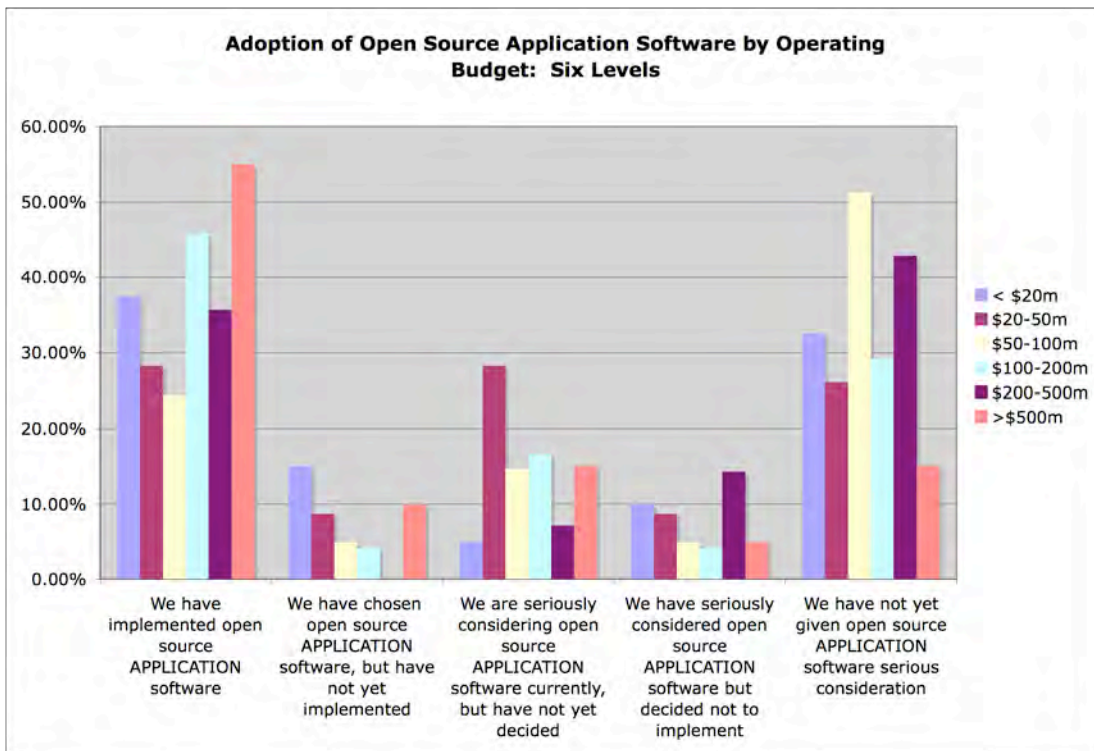
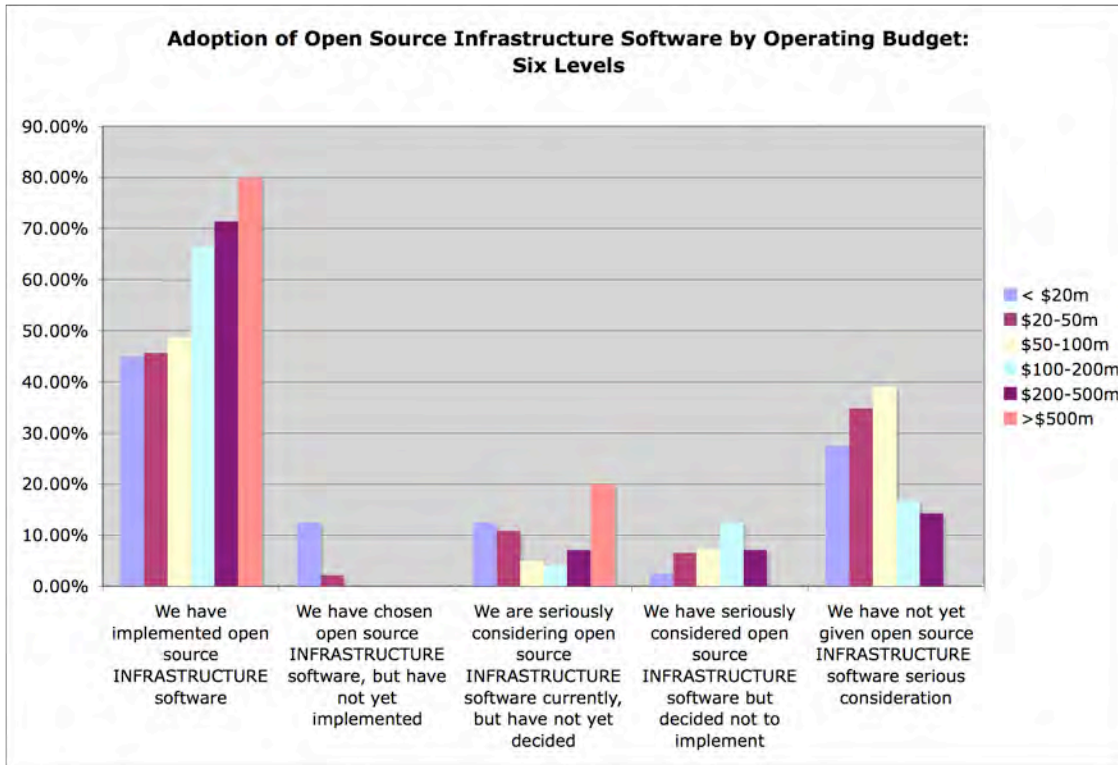
Open source infrastructure software has already been implemented in a majority of the higher education market while one-third have already implemented open source applications of some type. Less than 10% of the market has rejected open source software for their needs.

- Open source software was divided into two types for the purposes of this survey:
 - Open source *infrastructure* software includes operating systems, web servers, databases, reporting tools, authentication systems, etc. – the software that is primarily configured and “used” by the IT department.
 - Open source *application* software includes course management systems, student information systems, financial systems, etc. – the software that is primarily used and sometimes configured by non-IT staff, faculty or students. An important note is that non-open source products that are marketed as compatible with open source initiatives, such as SCT Luminis Platform and Unicon Academus were listed with the open source products for the purpose of this study.
- 57% of all respondents have implemented open source infrastructure software of some kind versus 34% have implemented open source application software of some kind. An important note is that whereas 34% indicated they have implemented open source application software, only 25% of the total respondents indicated implementation of the 10 named applications (asked later in the survey). This discrepancy means that either the respondents were over enthusiastic in their initial indication of open source application implementation or that they were referencing other open source applications not named in this survey (examples include open source discussion forums, survey tools, etc.) or some combination of both factors.
- An additional 3% of all respondents have only chosen but not yet implemented open source infrastructure software of some kind versus 8% have only chosen but not yet implemented open source application software of some kind.
- 6% of all respondents have only considered and rejected open source infrastructure software versus 8% have only considered and rejected open source application software.

- 24% of all respondents have not yet given serious consideration to open source infrastructure software versus 34% have not yet given serious consideration to open source application software.
- 10% of all respondents have only considered open source infrastructure software but have not yet decided versus 16% have only considered open source application software but have not yet decided.

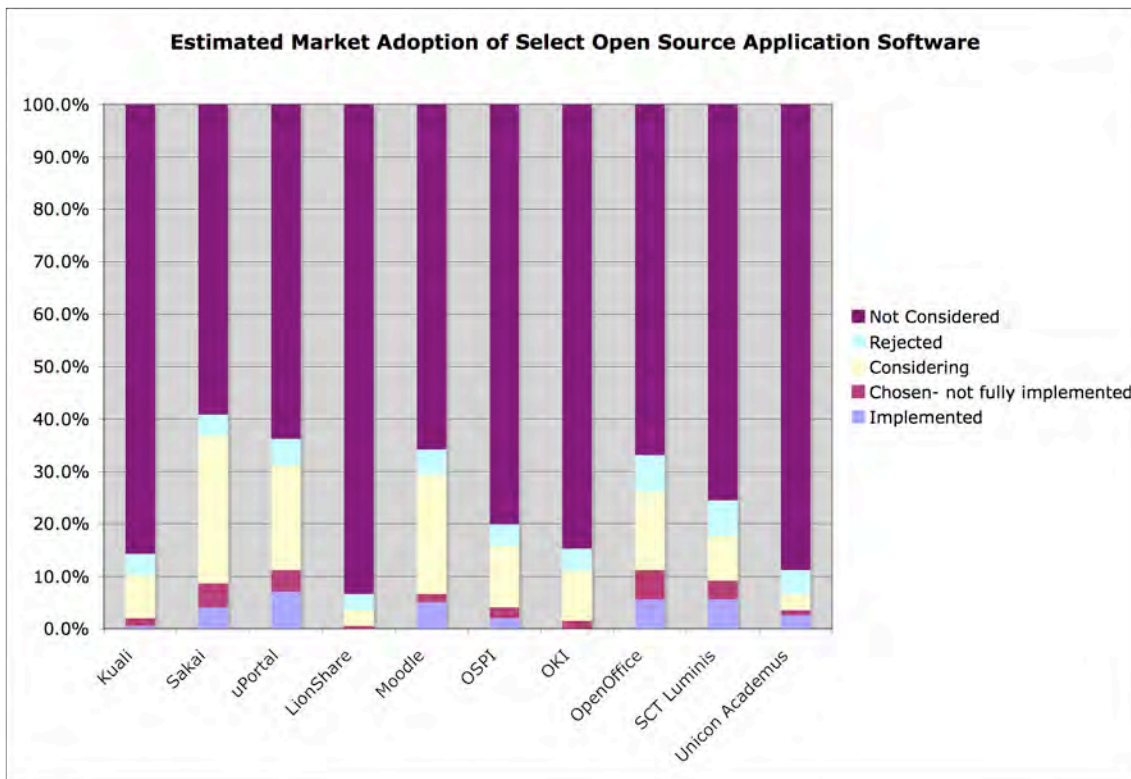


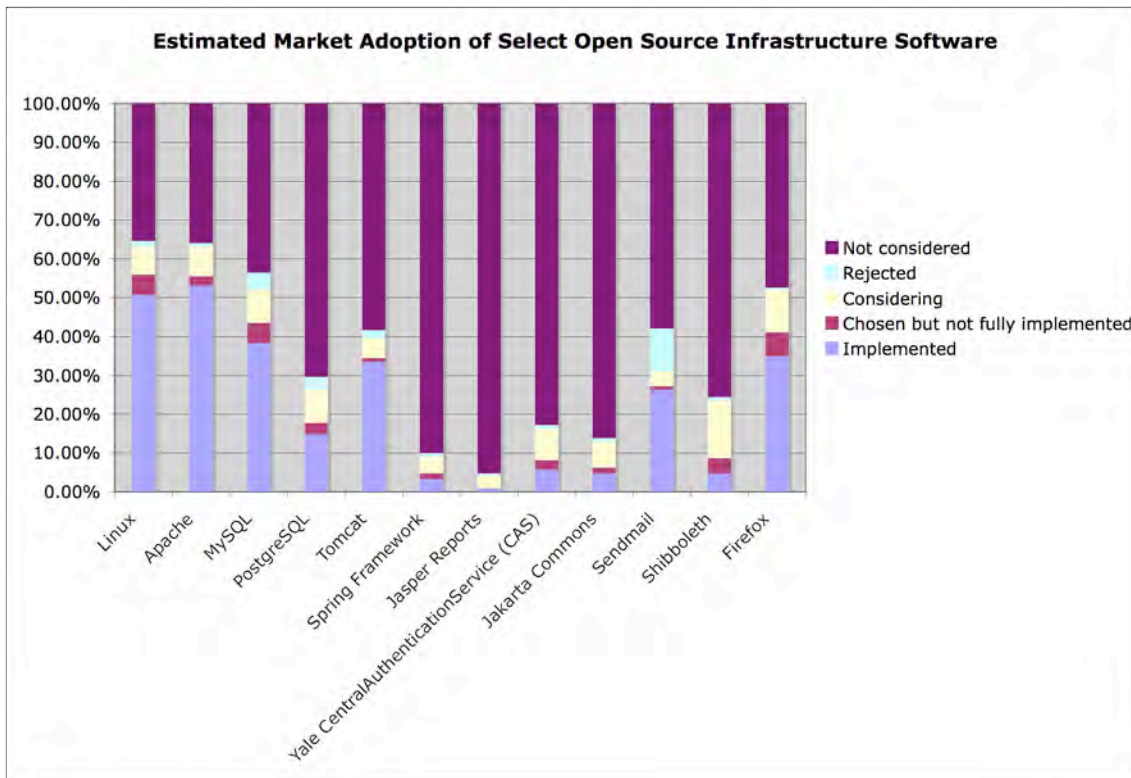
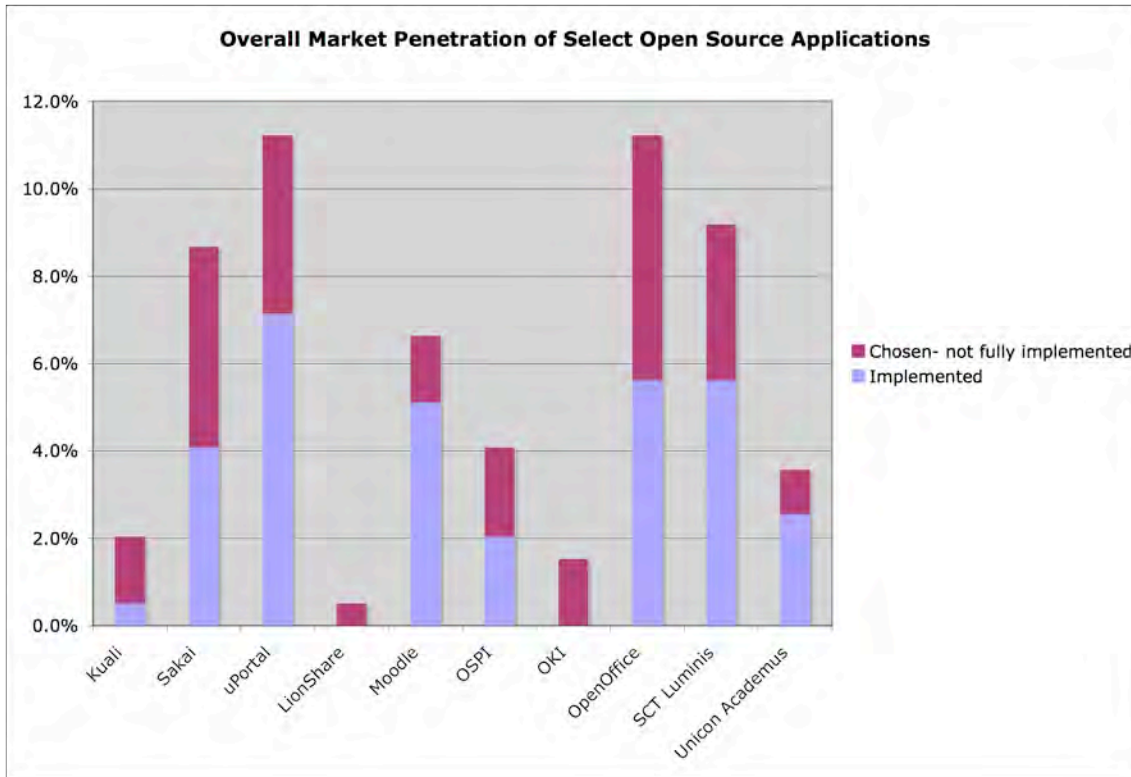




Adoption of Specific Open Source Software Products

Open source application software of some form has achieved an estimated adoption to implementation status in 25% of U.S. higher education institutions. The leading open source applications are portal (3 products for 15% adoption), course management system (2 products for 9% adoption), desktop office applications (1 product for 6% adoption), and student portfolio software (1 product for 2% adoption). Specific product adoption levels are uPortal (7%), OpenOffice (6%), SCT Luminis Platform (6%), Moodle (5%), Sakai (4%), Unicon Academus (3%), and OSPI (2%). Of the 57% of the market adopting open source infrastructure software the products with top adoption are Apache (53%), Linux (51%), MySQL (38%), Firefox (35%), and Tomcat (33%).

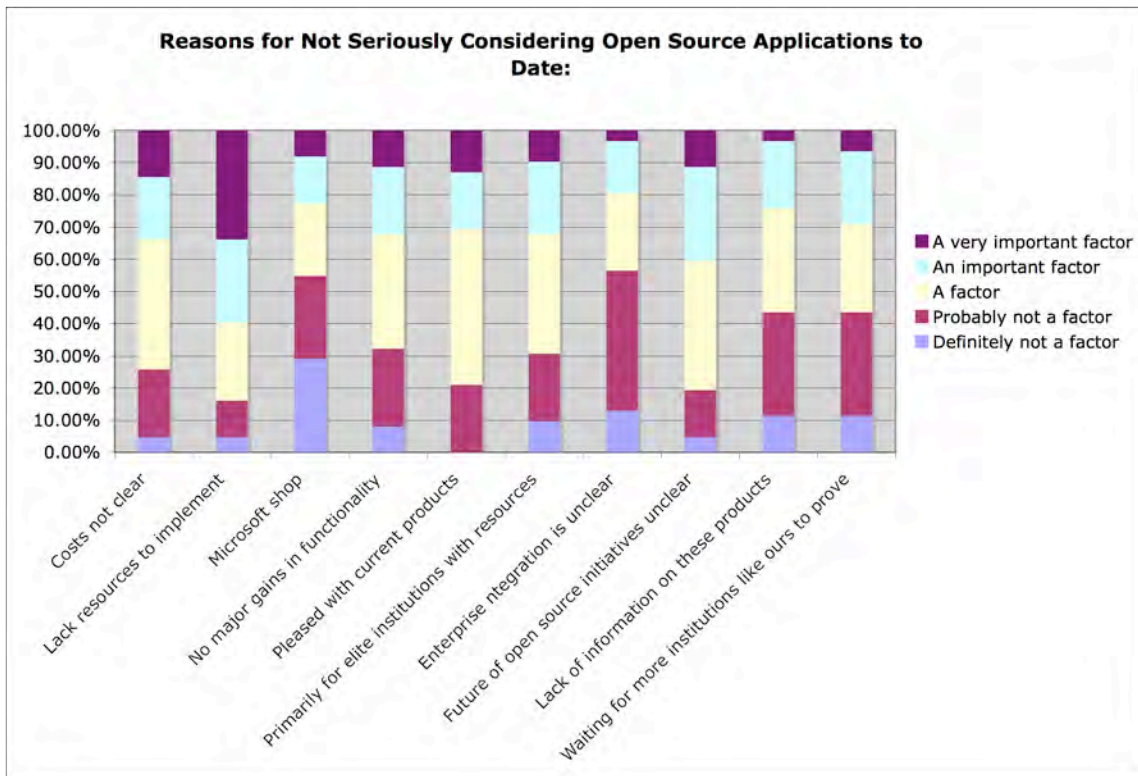




Hurdles to Serious Consideration of Open Source

Approximately one-third of the market (32%) has not yet given serious consideration to open source. This group is heavily weighted toward the smaller institutions. 74% of this group had operating budgets less than \$100 million.

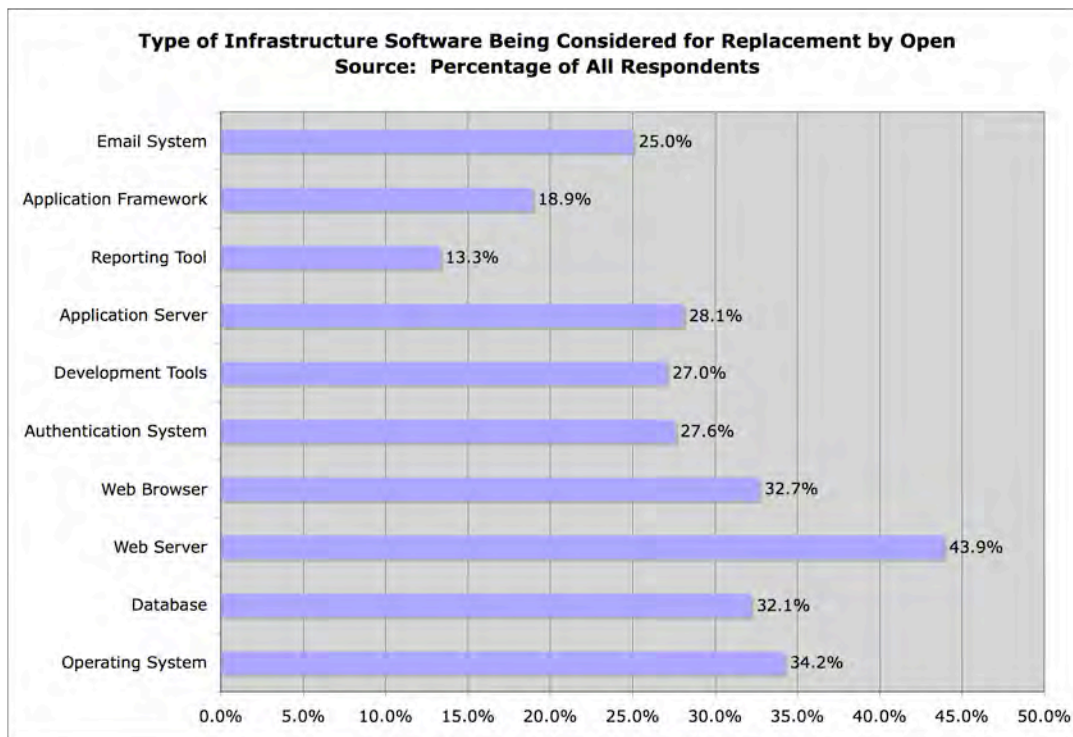
Of those that have not yet given serious consideration to open source the most important factors were lacking the resources to implement, an unclear future for open source in higher education, satisfaction with current non-open source products (and therefore no reason to change), and the costs are not clear.

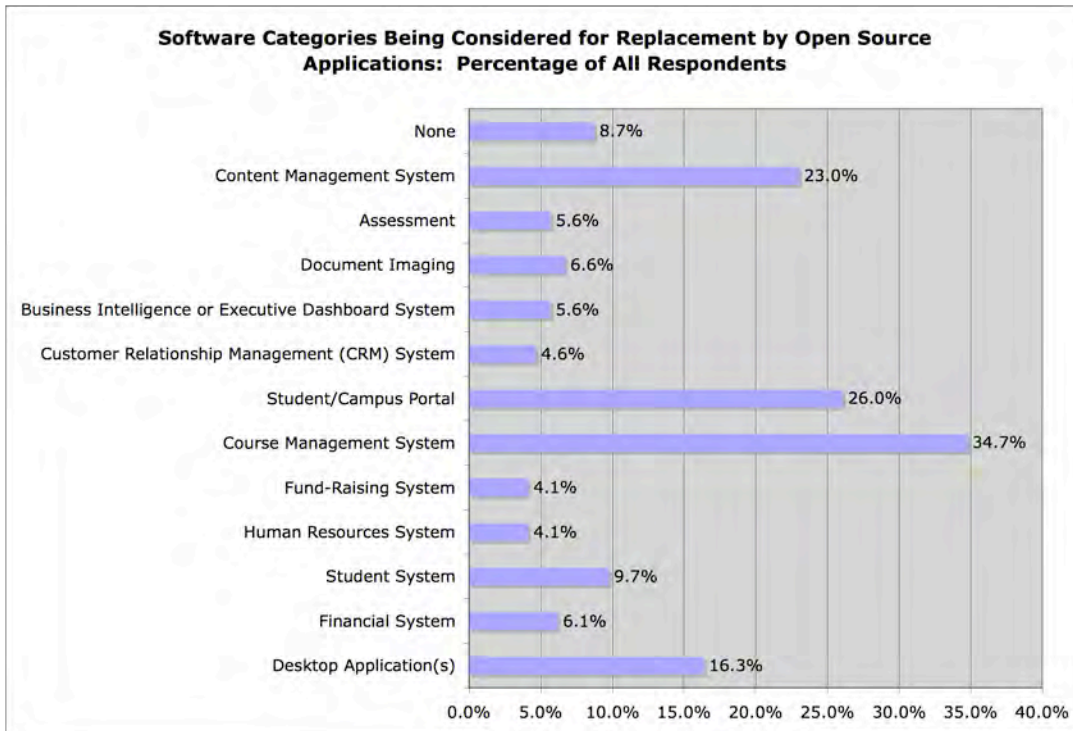
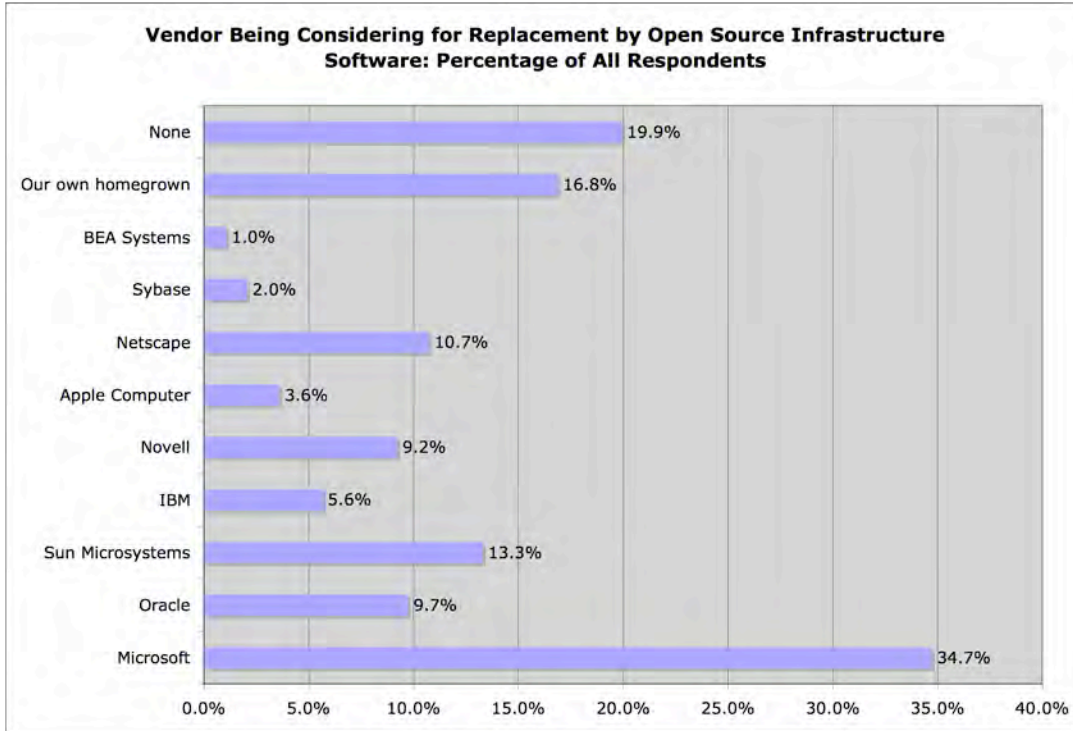


Candidates for Replacement

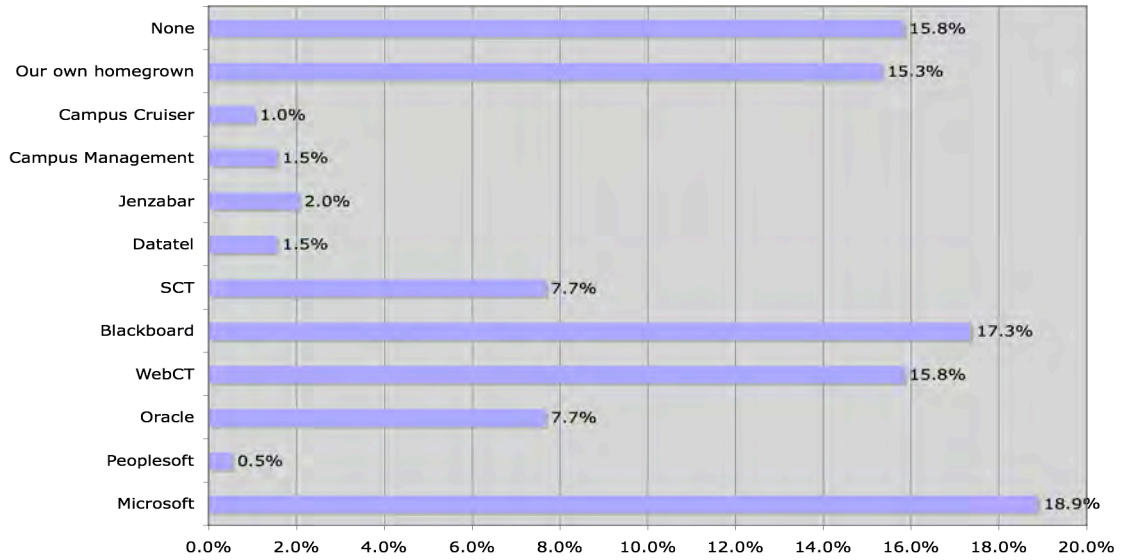
For infrastructure software 35% are considering replacing Microsoft, 17% are considering replacing homegrown software, 13% are considering replacing Sun Microsystems, 11% are considering replacing Netscape, and 10% are considering replacing Oracle. For application software, 19% of all respondents are considering replacement of Microsoft, 17% are considering replacement of Blackboard, 16% are considering replacement of WebCT, and 15% are considering replacing homegrown software.

It is important to note that estimates of replacement applications and vendors did not attempt to normalize for market share. Therefore in some sense those products and vendors with higher market share were 'penalized' because the prevalence in the market made them more likely to be replaced.



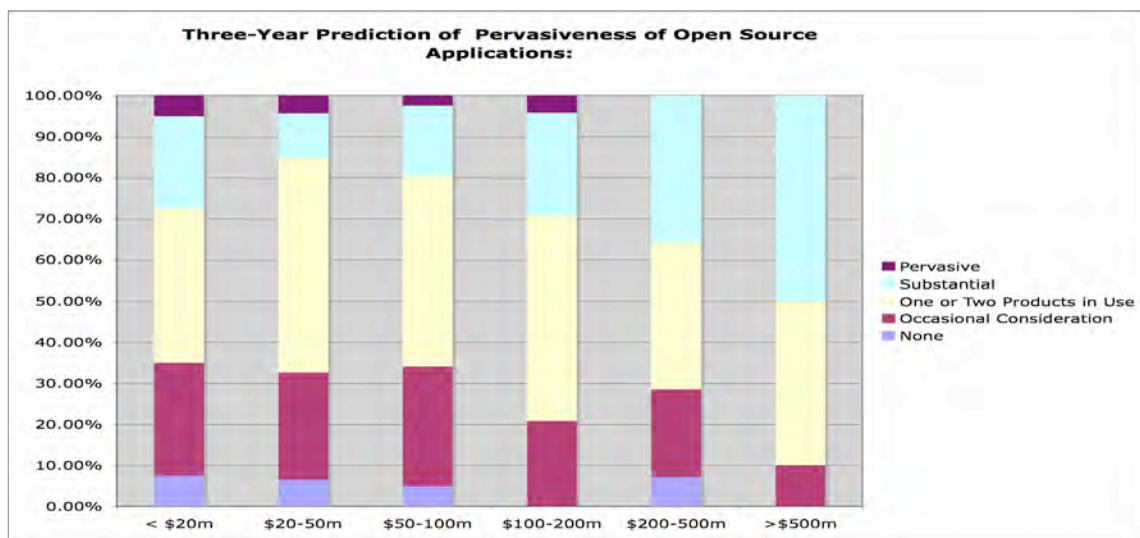
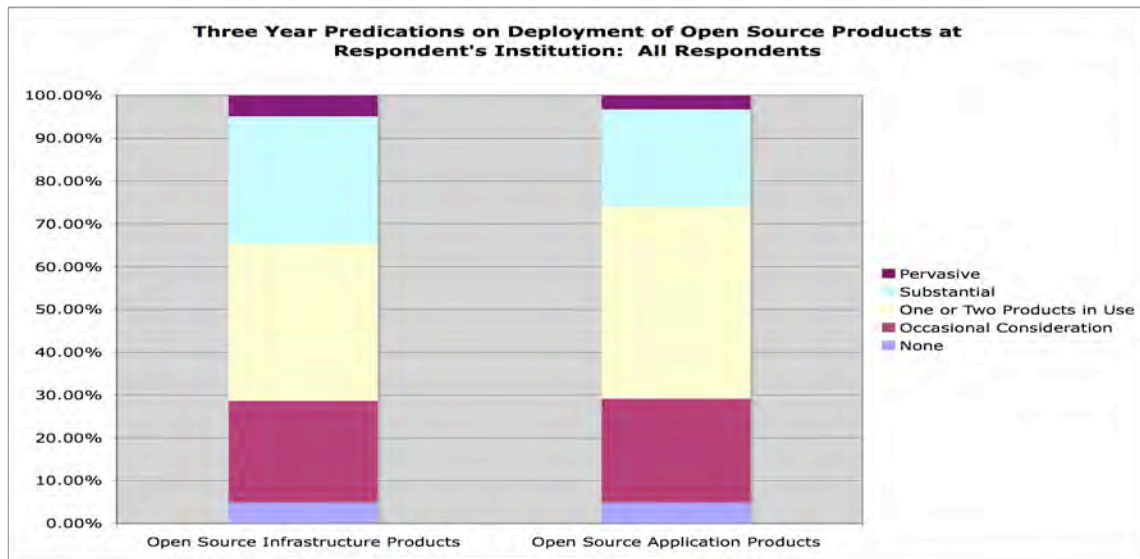


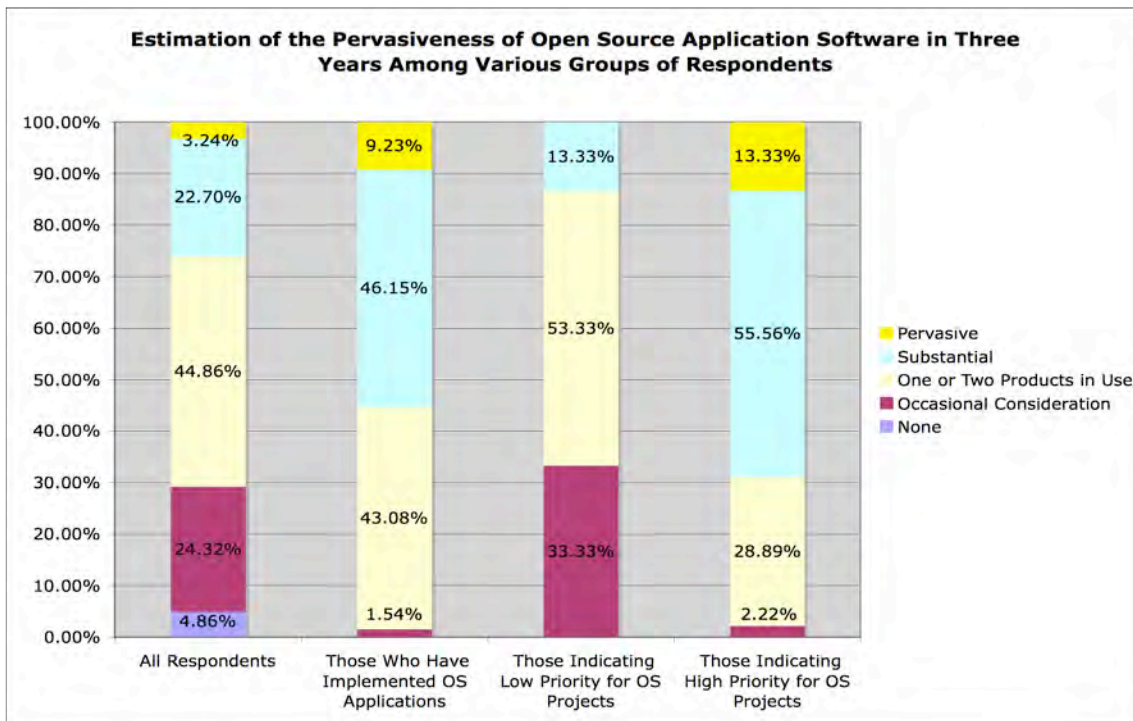
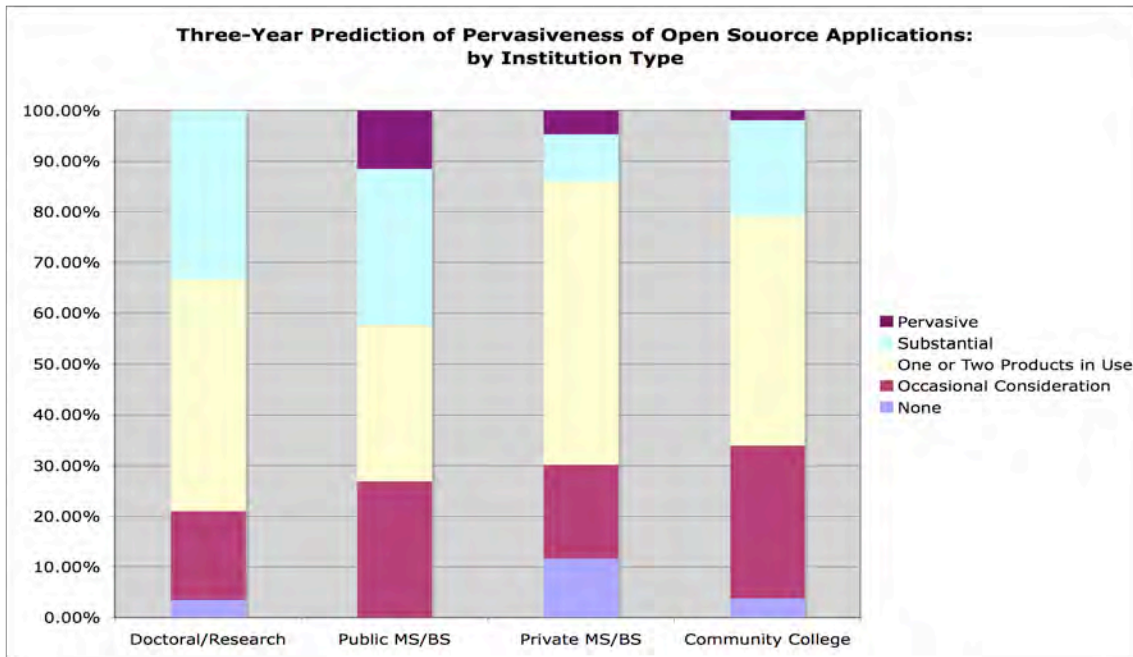
**Vendors Being Considered for Replacement by Open Source Applications:
Percentage of All Respondents**



Attitudes About the Future of Open Source Applications

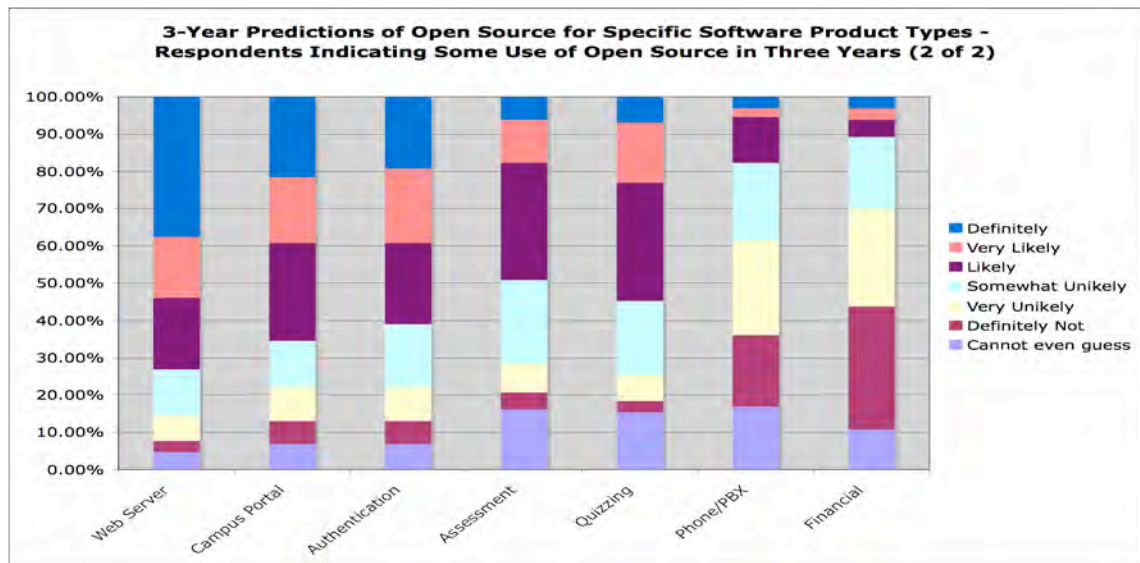
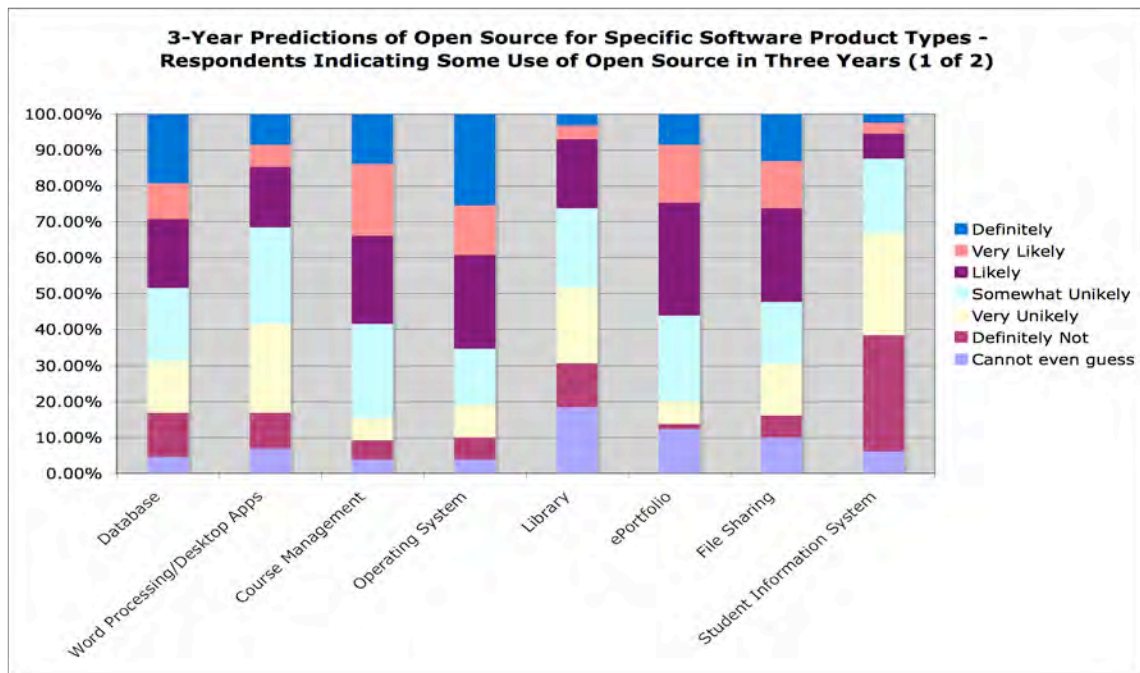
Attitudes about the future of open source applications in higher education are positive across all institution types and operating budgets, with large public institutions most positive. The predictions for usage of open source applications is roughly equivalent to the prediction for infrastructure despite the more predominate presence of open source infrastructure today. 26% of all respondents believe open source application presence in their institutions will be substantial in three years. This percentage jumps to 55% for those who have already implemented an open source application and 69% for those consider open source initiatives as higher priority among all IT initiatives.





Applications Deemed Likely to be Implemented Primarily Through Open Source in Three Years

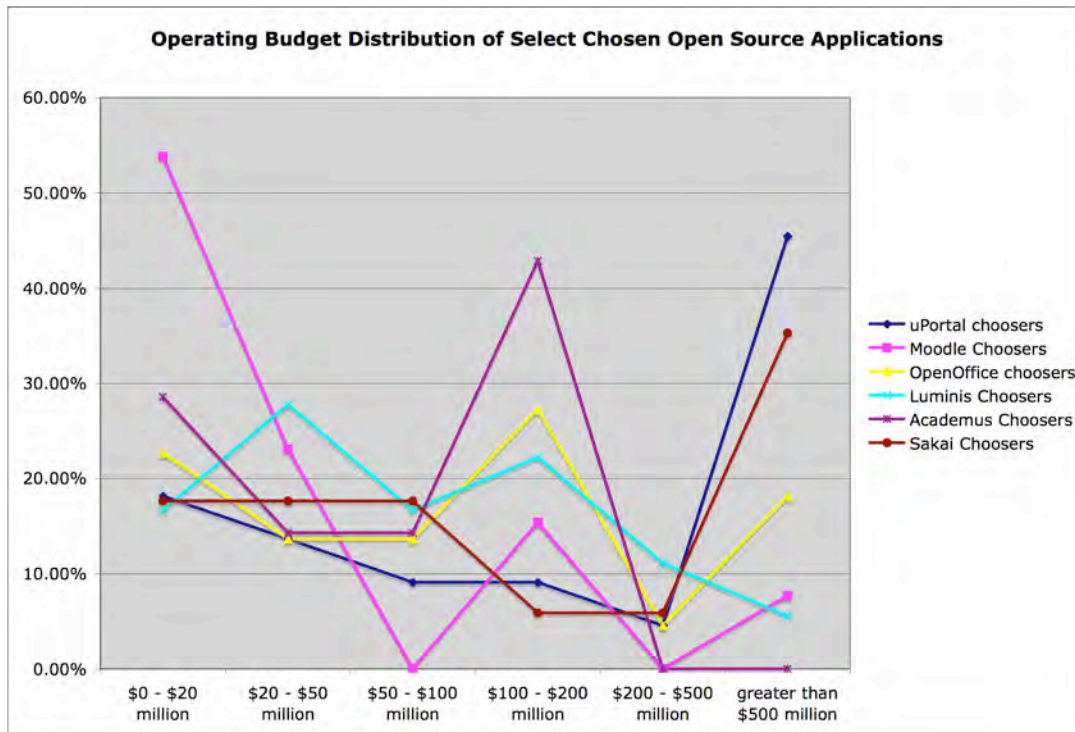
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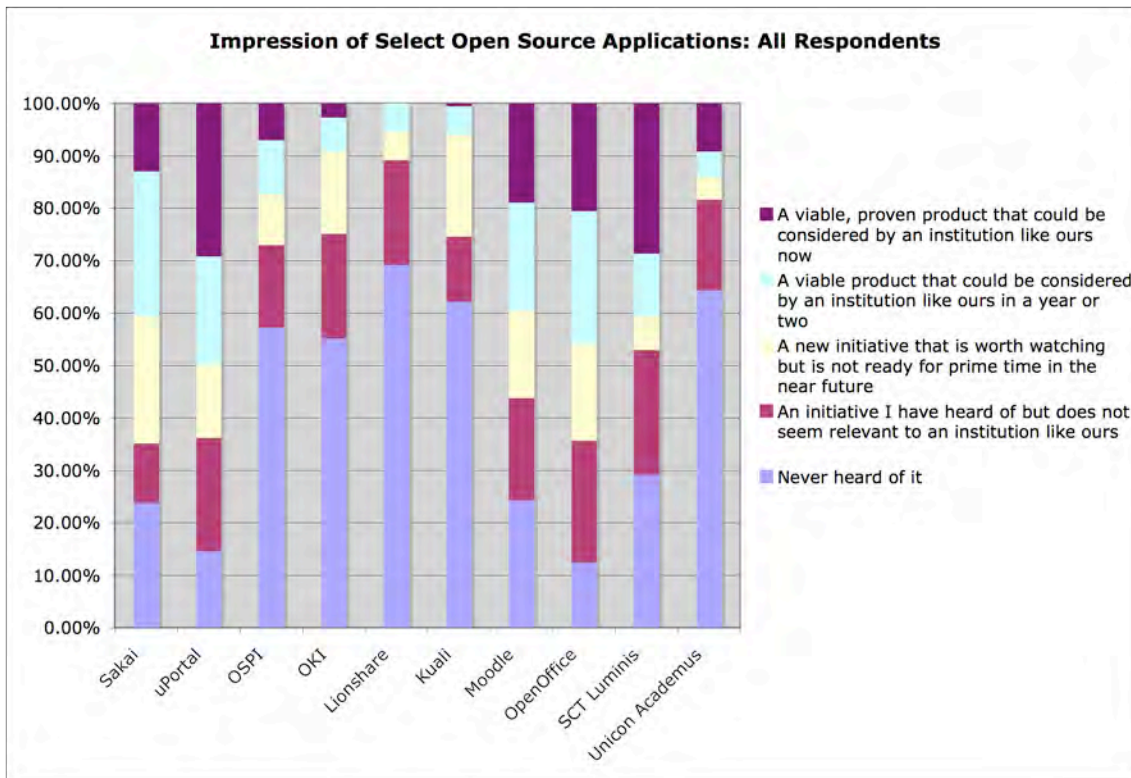
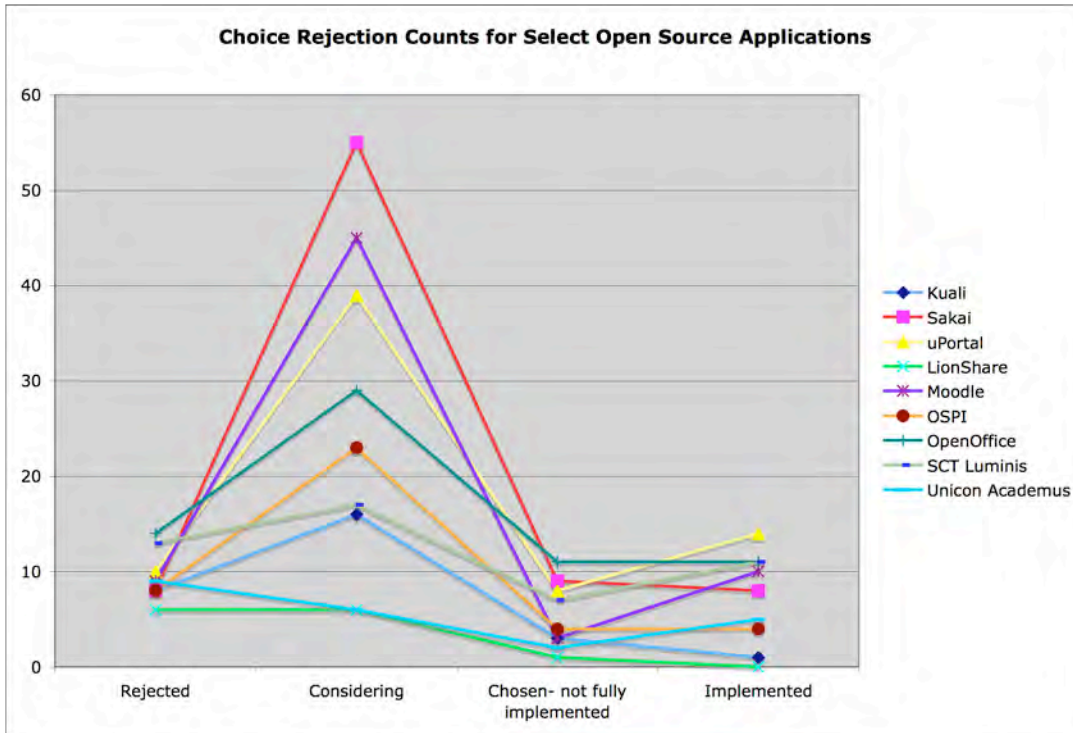


Adoption Characteristics of Select Open Source Application Products

The larger institutions have dominated the grant-funded initiatives (uPortal, Sakai, Kuali). But, there has been some spread to the lower operating budget institutions now as well, many times in conjunction with a non-open source product that is “open source compatible”. In addition Moodle, a market-driven open source alternative in course management systems, has emerged. It appears that Moodle has captured significant interest from lower operating budget efforts. This is similar to the way that true market-driven open source efforts (such as Linux, Apache, etc.) were strongest in the lower end of the commercial market and gained significant market share there before moving into the enterprise.

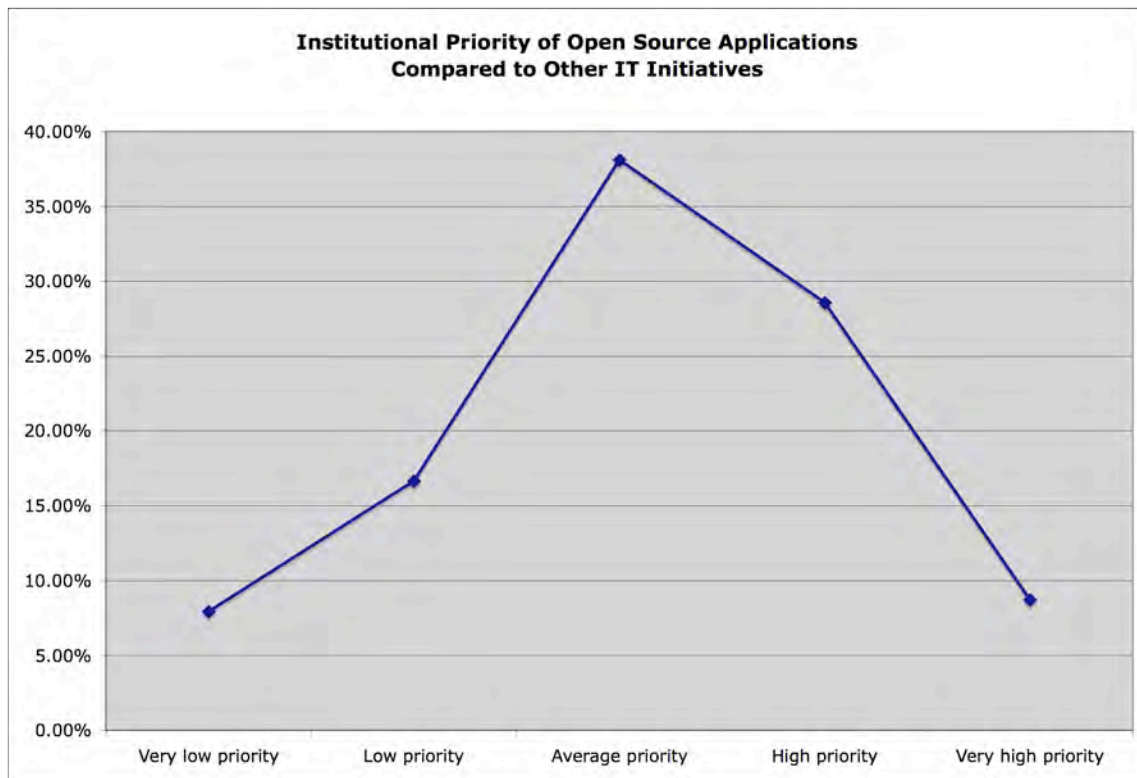
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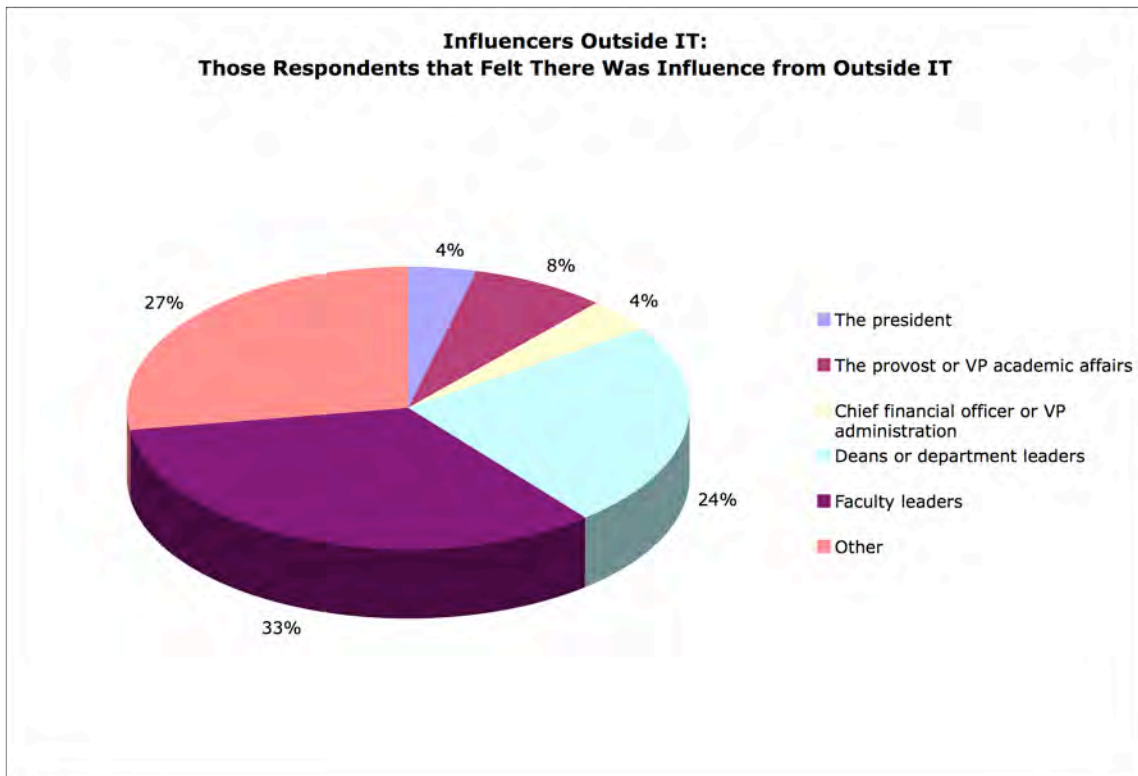
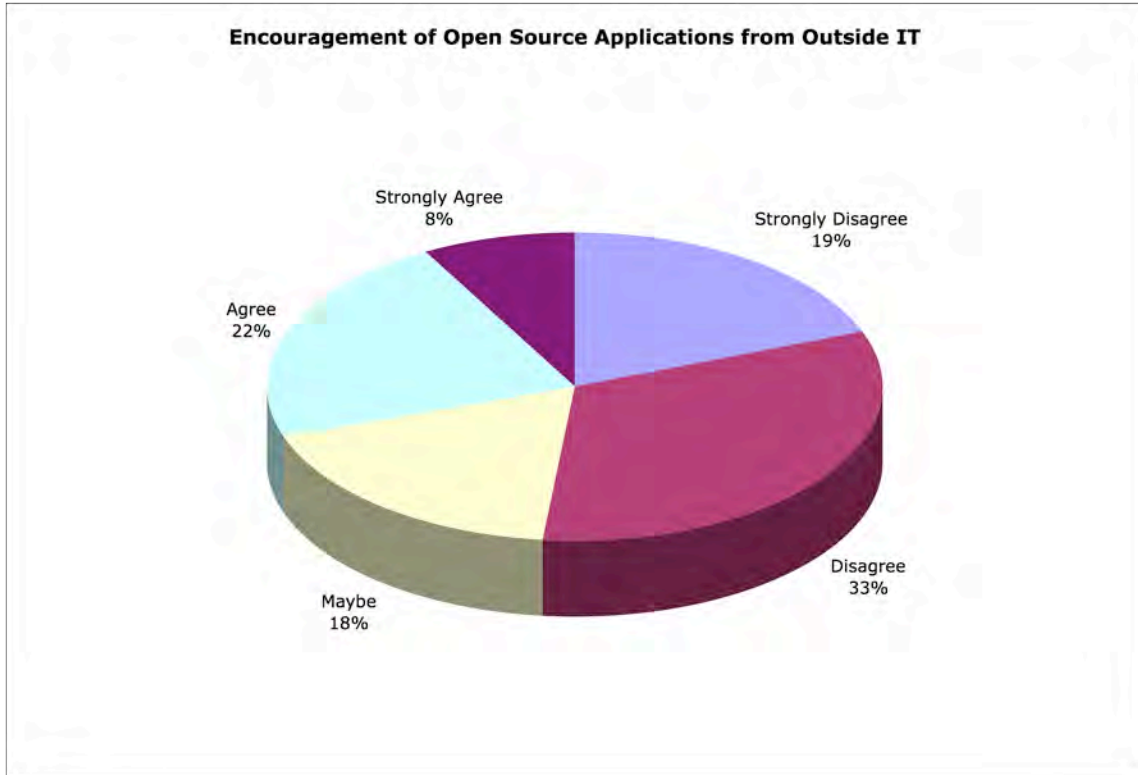




Organizational Influences on Open Source

Open source initiatives appear to be primarily of average priority and IT-driven at the majority of institutions. Only 30% indicate influence from outside of IT in the movement toward open source. Of those indicating outside influence only 16% indicate influence from the executive level. The primary outside influencers are faculty leaders followed by department heads.

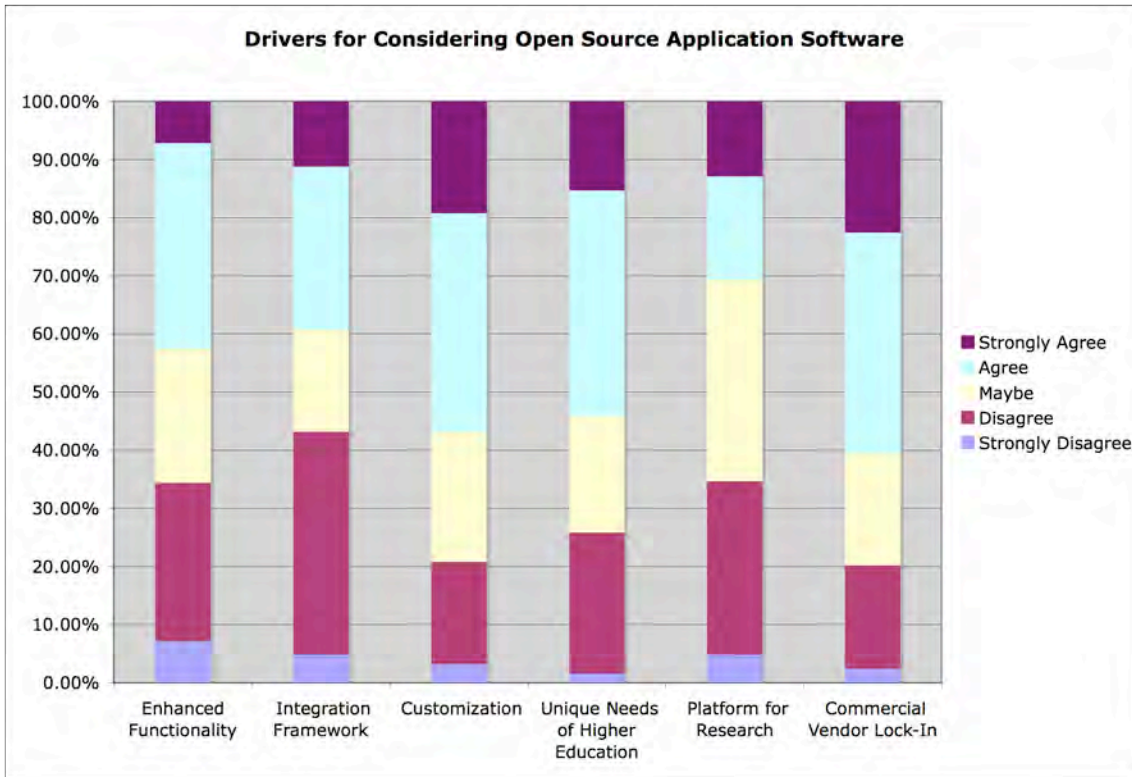
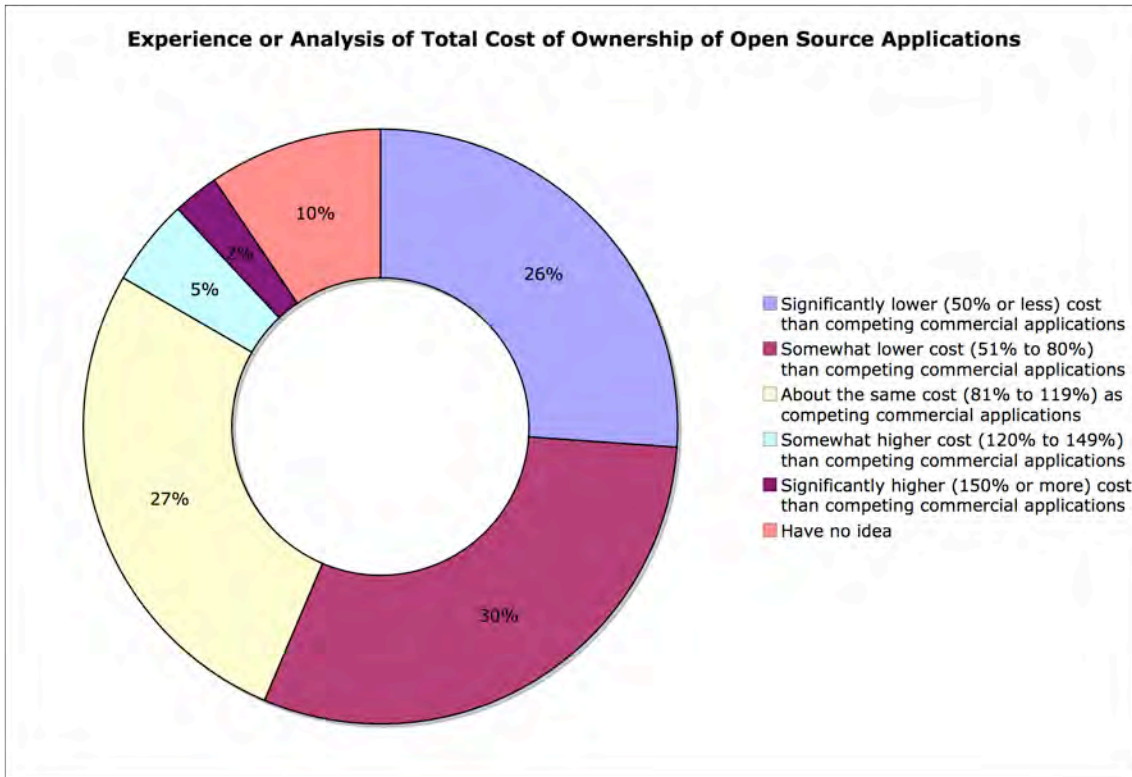


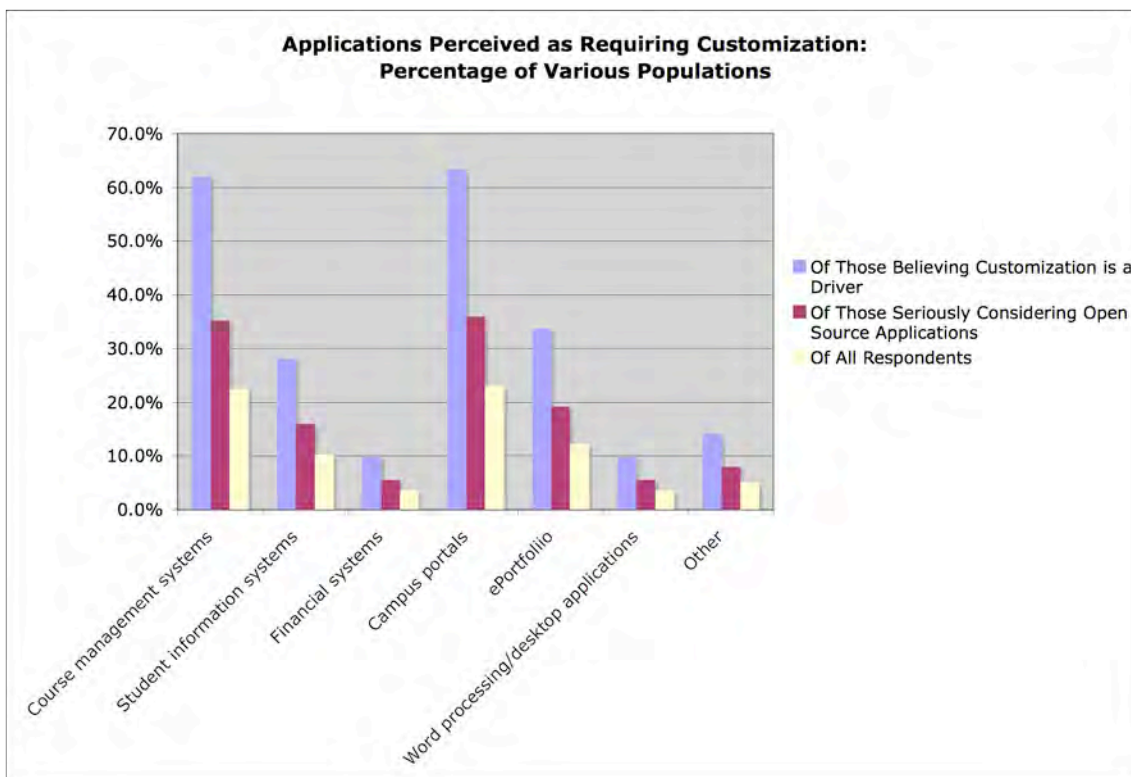
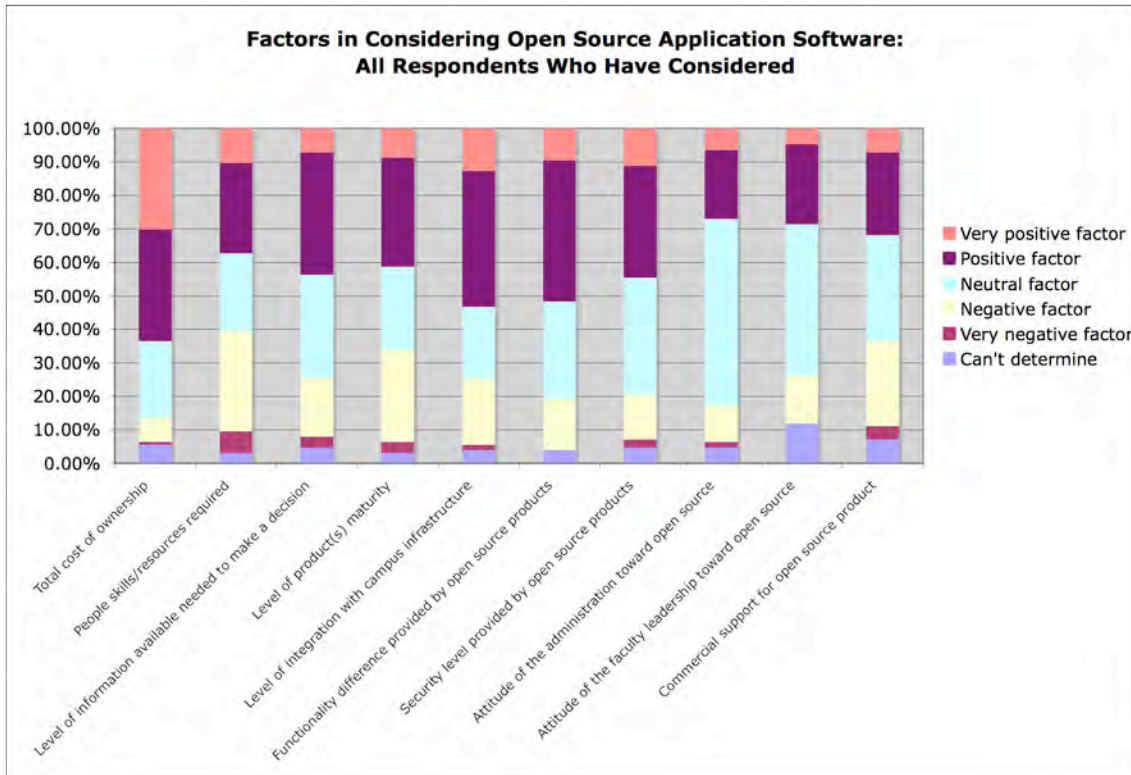


Business Drivers for Open Source

Overall the business drivers most cited for considering open source are cost (total cost of ownership), control (avoiding commercial vendor lock-in), and the opportunity for innovation (customization) against a backdrop of the perception of a unique higher education market. 56% of those who have implemented or evaluated open source applications believe there is a total cost of ownership advantage vs. only 7% who believe there is a total cost of ownership disadvantage.

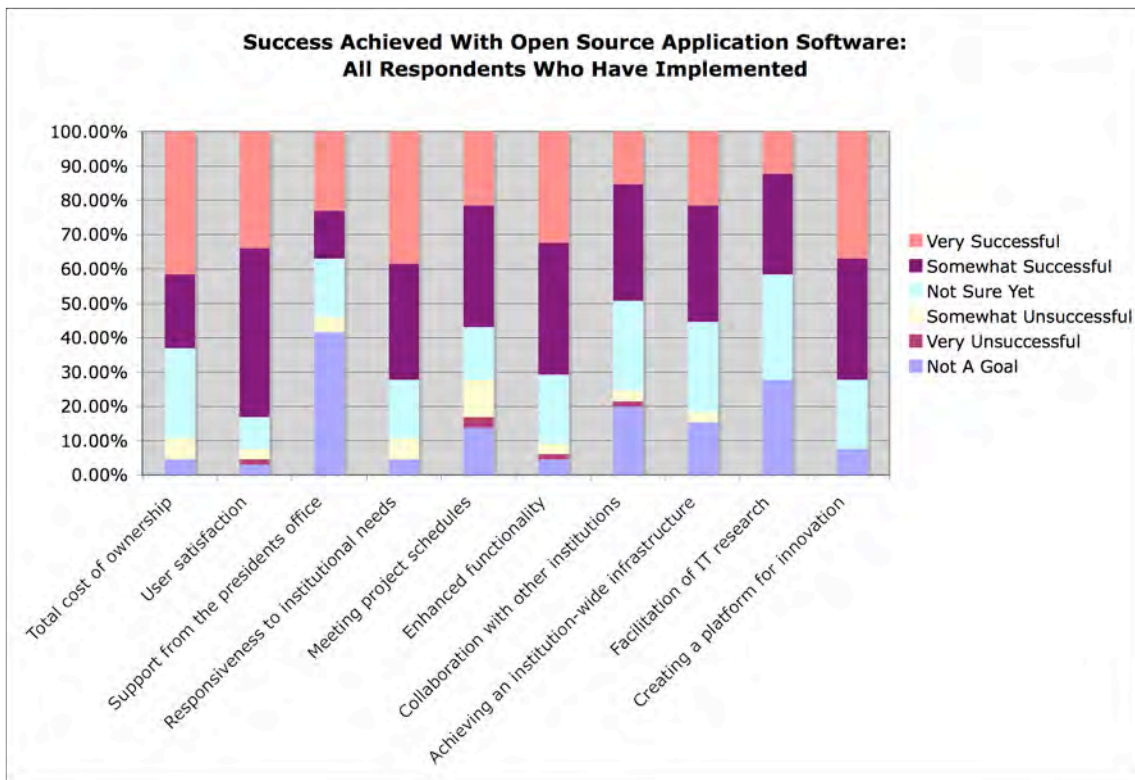
- Those who have implemented or evaluated open source application products (64% of the total population) believe that open source entails a lower total cost of ownership.
- 26% believe through their experience or analysis that the total cost of ownership is 50% or less than non-open source solutions.
- 30% believe that the total cost of ownership is 51% to 80% of non-open source solutions.
- 27% believe the total cost of ownership is about the same.
- Only 7% believe the total cost of ownership is higher or significantly higher.
- 10% have no idea what the total cost of ownership is.
- Of the evaluation factors in considering open source total cost of ownership, integration with the campus infrastructure, functionality difference, and security were rated the most positive.
- However, those expressing specific needs for improved functionality were a minority of the overall population: 18% indicating the need for improved functionality in course management systems and portals, 9% in ePortfolios, 7% in student information systems, 5% in desktop applications, and 3% in financial systems.
- Of the evaluation factors in considering open source people skills required, commercial support, and level of product maturity were rated the most negative.





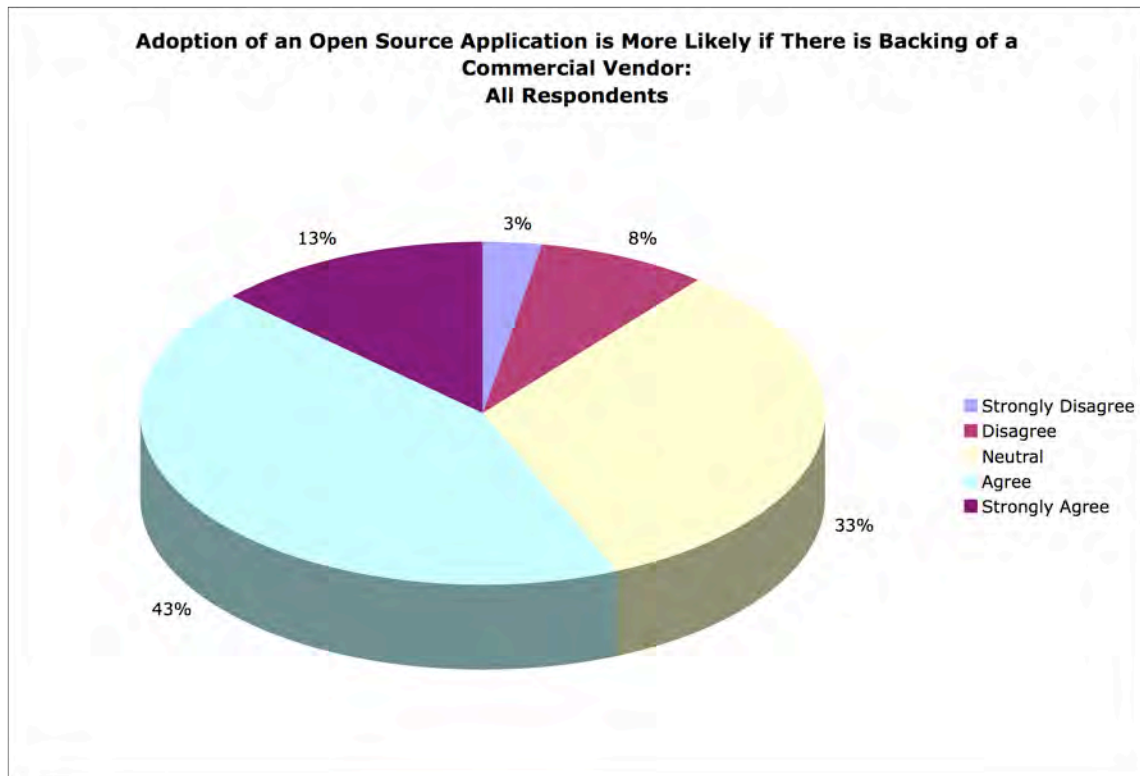
Successes of Open Source Application Products

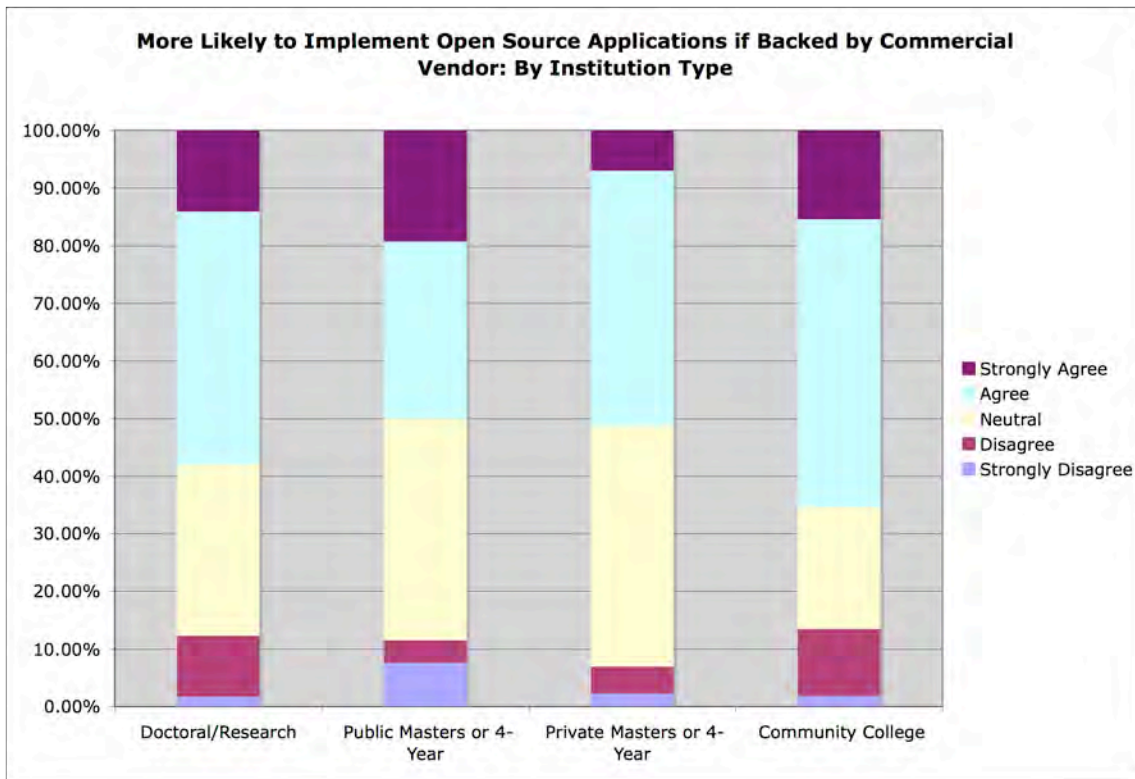
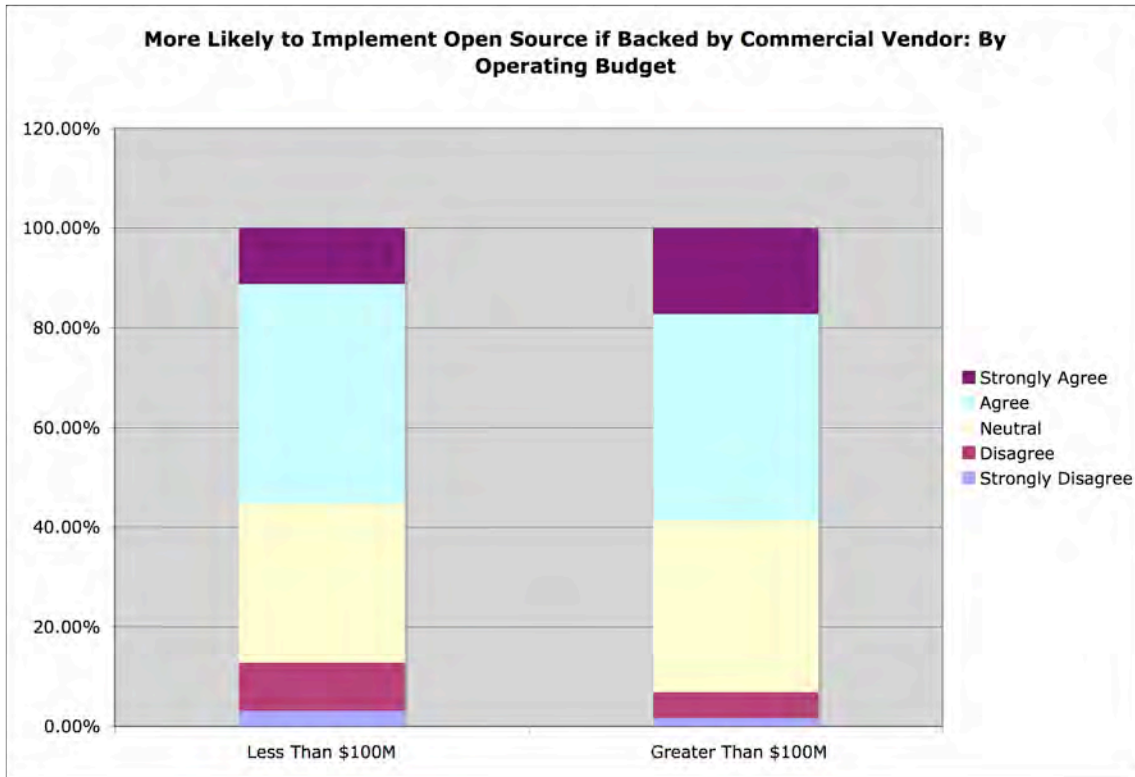
Of those who have implemented open source application products the areas in which they feel they have been most successful are user satisfaction, creating a platform for innovation, responsiveness to institutional needs, enhanced functionality, and total cost of ownership.

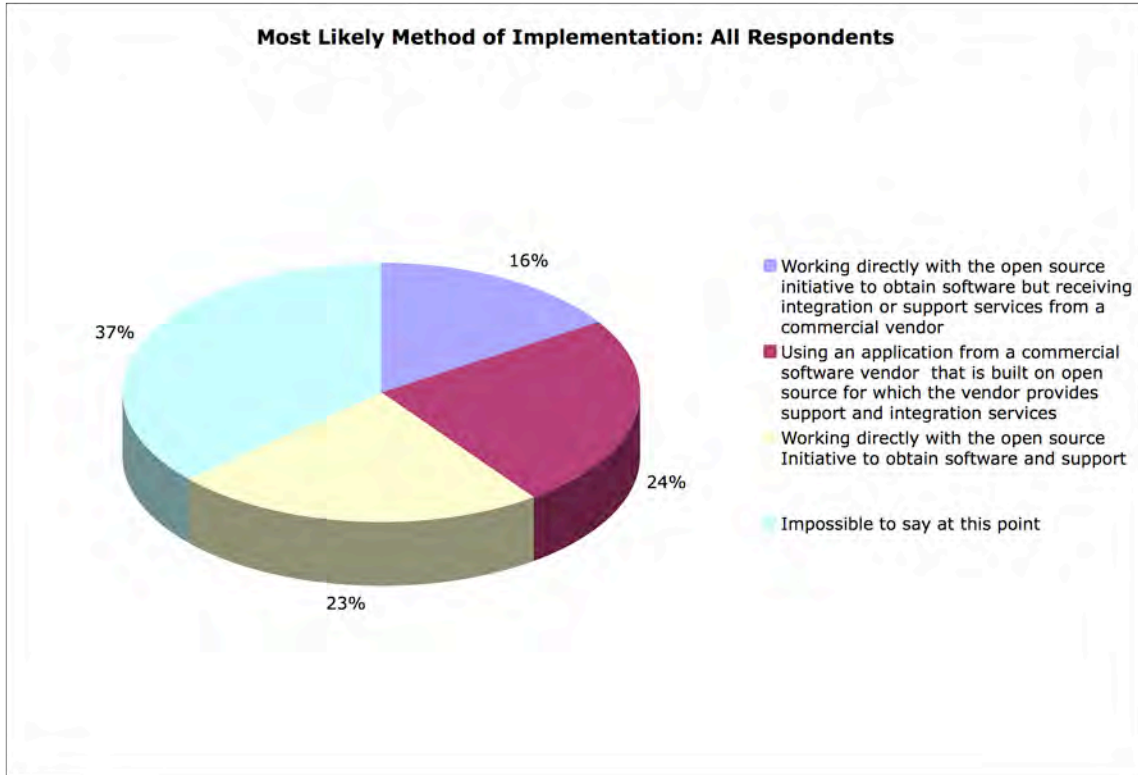


Influence of Commercial Vendors on Open Source

The influence of commercial vendors on the growth of open source applications in higher education will be a key factor. 56% of all respondents agreed that their institution is more likely to adopt open source if backed by a commercial vendor versus only 11% who saw this as a negative factor. Of those who did not think it was too early to speculate, two to one believed they would work with a commercial vendor in some capacity vs. only with the open source group.

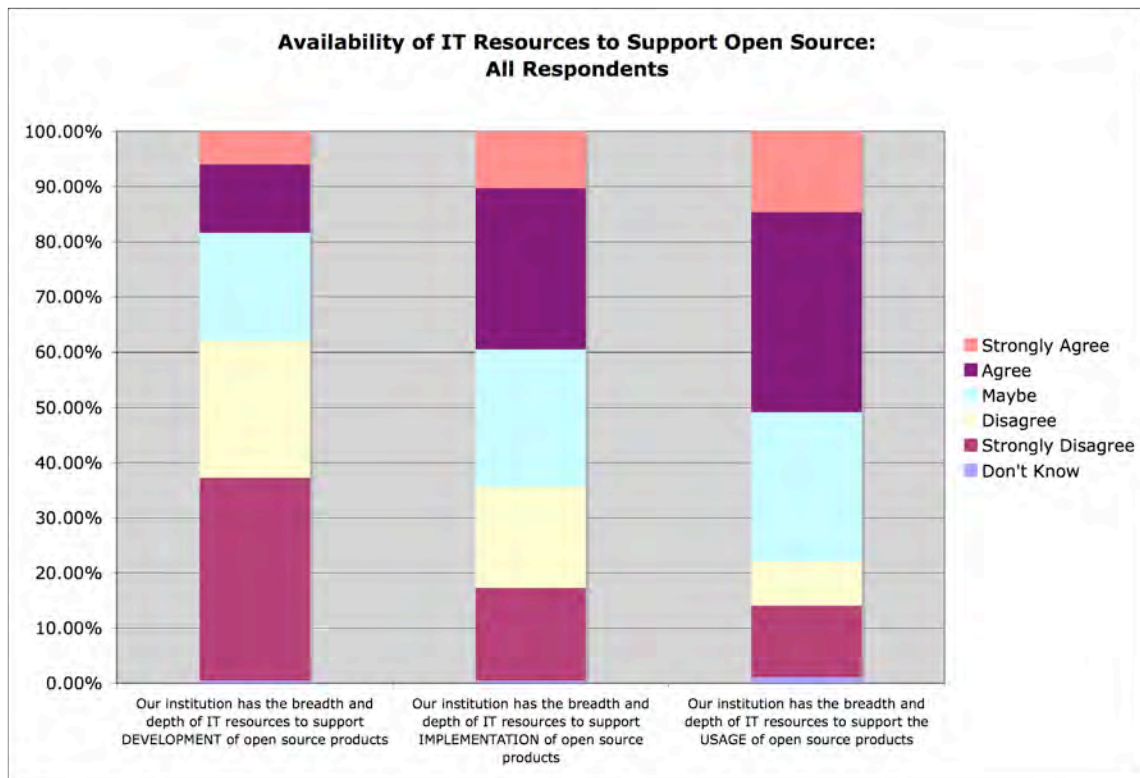


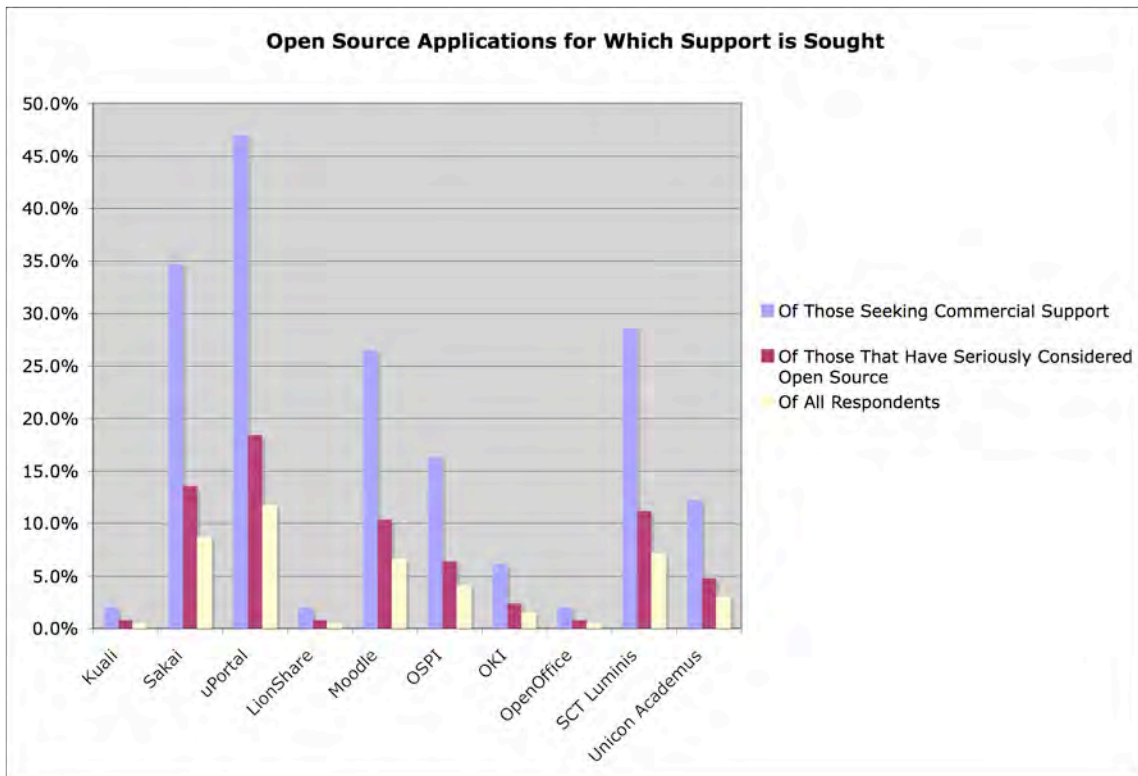
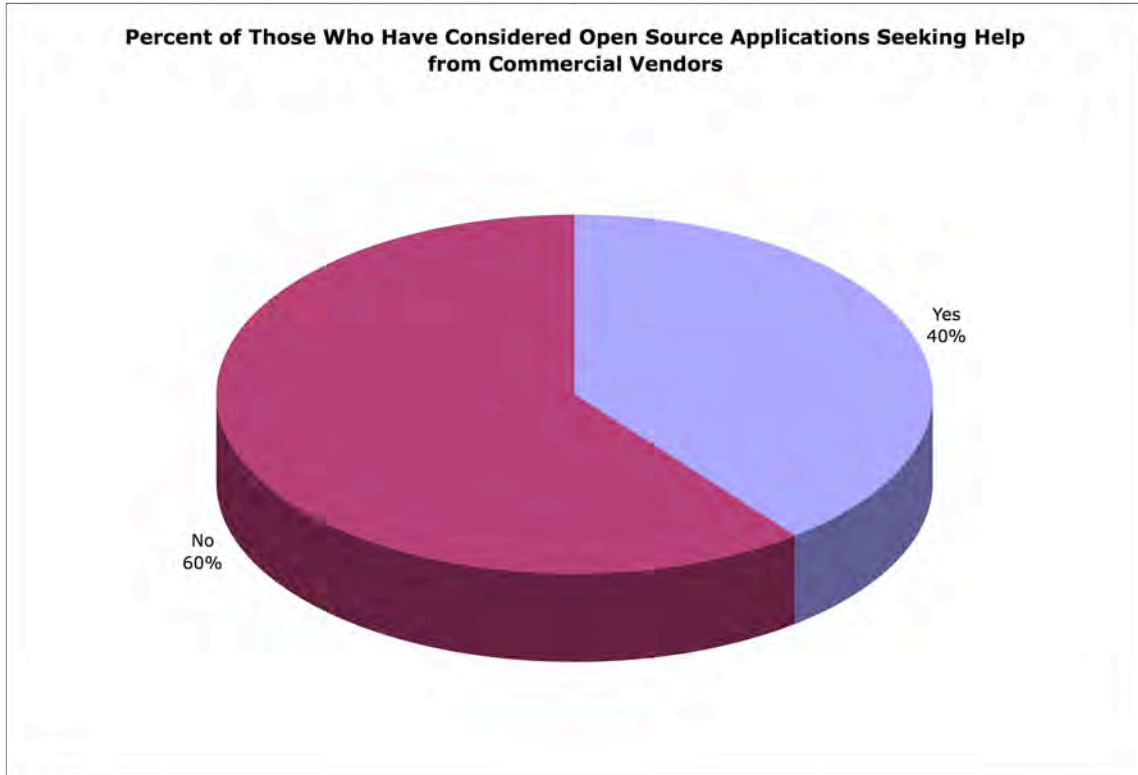


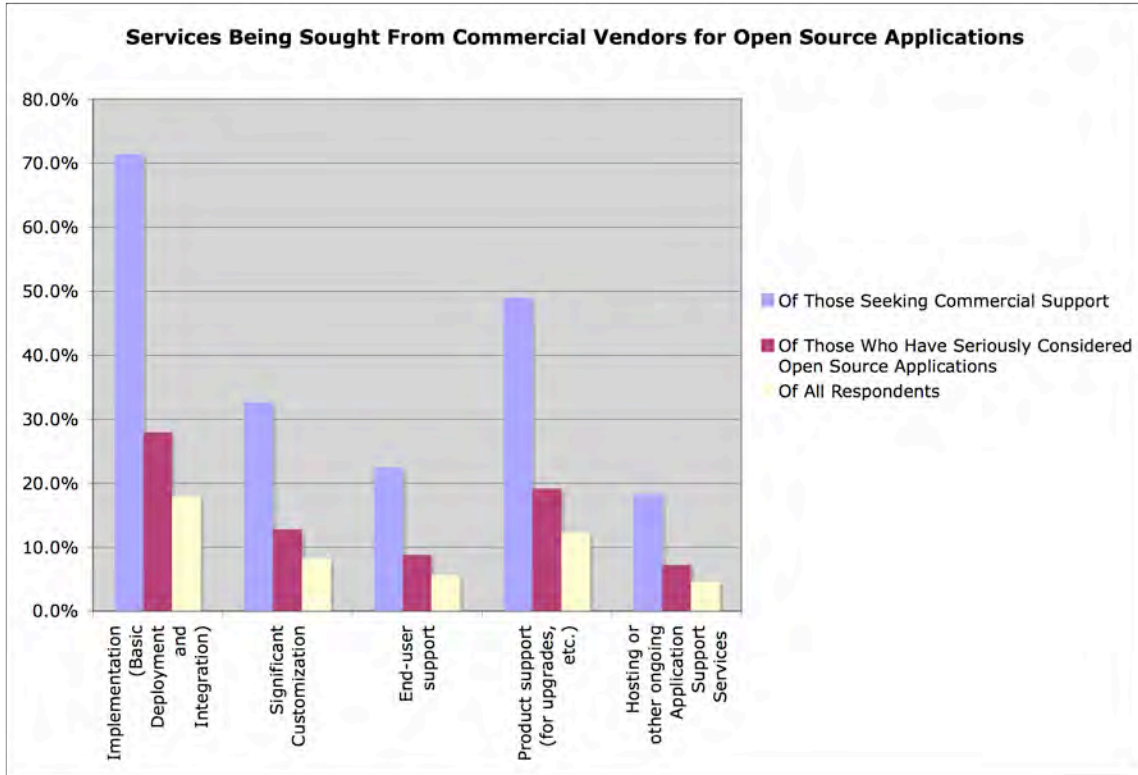


Market for Open Source Services

While impossible to gauge for sure the current market for services in conjunction with open source applications appears to be too fragmented and non-recurring to represent a significant opportunity. About 25% of the market is seeking some outside help with open source but this is distributed among some ten initiatives. uPortal, Sakai, SCT Luminis Platform, and Moodle are those most in need of external services with implementation, product support, and customization the most needed services. The ongoing services of end-user support and hosting were the least sought after.







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About the Author

Rob Abel is an education industry researcher, consultant, author, and analyst focused on transformation, innovation, and effectiveness in higher education. He founded the Alliance for Higher Education Competitiveness (A-HEC) in May 2004 for the purpose of performing research to uncover and disseminate best practices that enable transformation. In order to fulfill this mission in a scalable fashion, Rob has lead the development a new action research methodology of participatory evaluation that facilitates institutional collaboration. A-HEC's mission is to help the United States and the world meet the challenge of providing postsecondary education to more people. A-HEC corporate and institutional sponsors are "***Working Together to Educate More People.***"



Prior to founding A-HEC Rob was the Senior Vice President of Client Services for Collegis (now SunGard Collegis) where he was responsible for services delivered to more than 60 higher education institutions. Rob also served as General Manager of Collegis' Online and Academic Services business unit (formerly known as Eduprise), Chief Marketing Officer, and Senior Vice President of Business Development.

Rob has over 25 years experience in high tech general management, business development, marketing, and product development at Oracle Corporation, National Semiconductor, TRW, and Hughes Aircraft.

Rob has earned an undergraduate degree in Computational Physics from Carnegie Mellon University, a graduate degree in Computer Engineering from USC, and a graduate degree in Engineering Management from Stanford. He is currently a doctoral student in the Educational Leadership and Change program at Fielding Graduate University.

Rob has been recognized as a National Merit Scholar, a Hughes Master Fellow, and the recipient of the TRW Chairman's Award for Innovation.