Apereo Foundation

Open Source in Higher Education

A preliminary report

25 YEARS EXPERIENCE

95 Committing Institutions

763 Contributors

13 Open Source Projects

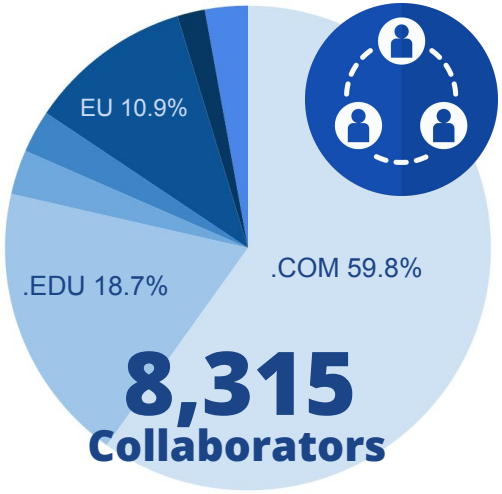
Sakai

uPortal

OPENCAST

CAS

Xerte
an apereo community project



GLOBAL ADOPTION

• Ambedkar University Delhi •
• Australian Catholic University • BYU •
• Carnegie Mellon • Cornell • Duke •
• George Washington • Harvard •
• John Hopkins • Nagano • NYU •
• Pan Africa Christian • Penn State •
• Politecnico di Milano • Purdue • Rutgers •
• UC Berkeley • Universidad de Guadalajara •
• Universidade de Brasília •
• Universidades Regionales de Chile •
• Universiteit Gent • Université Polytechnique • •
Hauts-de-France • University of Cape Town •
• University of Edinburgh •
• University of Ghana • University of Illinois •
• University of Massachusetts •
• University of Michigan •
...and 200+ more,

MONTHLY ENGAGEMENT…

Registrations: 1,398, Countries: 46
Universities: 292, Colleges: 48
Research Institutes: 10, Libraries: 26
Corporations: Bitergia, Capital One, CERN, D2L, Fastly, Ford, HPE, IBM, Instructure, Kuwait Airlines, Redhat…**Non-profit:** Alma Linux, OpenEdX, Creative Commons, Eclipse Foundation, FreeBSD., Linux Foundation, Moodle,Open Source Initiative, Python Software Foundation, Rust Foundation, SPARC, Tor,UNICEF, U.S. Army…

COMMUNITY

Director (23%)
C-Suite (17%)
Business Dev (12%)
Ex. Director (11%)
Manager (10%)
Software/Tech. (10%)
Faculty (7%)

Research Motivations

“Open Source Won”
-Wired Magazine

“96% of commercial codebases contain open source — and 77% of that code is open source”
- Synopsys

“70–90% of any given software codebase is made up of open source components”
- Linux Foundation

“96% of the computer programs used by major industries include open source software, and 76% of those programs consist of open source software”
- MIT

“On average, 90% of software is open source software (OSS)”
- Open Source Security Foundation

Observations & Assumptions

Open source software is ubiquitous across industries.

The development and adoption of open source software in higher education should mirror other industries.

Increasing interest, requirements, regulations regarding OSS will (are) impact campuses.

Low/Lacking awareness of open source development and dependencies on campuses.

Research Objectives

Understand Current Perceptions: Assess the perceptions and attitudes of higher education leaders and influencers towards open source software in the academic realm.

Describe Demand: Delineate the current utilization landscape of enterprise open source software in academic and research institutions.

Determine Applicability: Identify specific areas and use cases where enterprise open source software is effectively applied within higher education settings.

Discover Trends: Analyze trends and emerging patterns in the adoption and deployment of open source solutions in academic and research environments.

Identify Opportunities: To provide actionable insights for decision-makers and stakeholders regarding the potential expansion and optimization of enterprise open source software within the higher education sector.

Research Questions

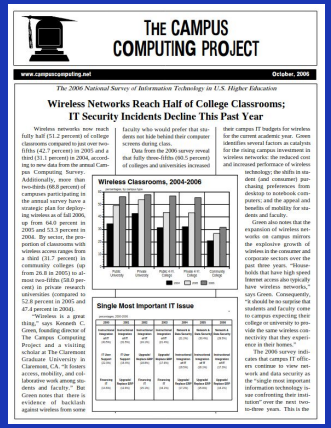
What is the **perception** of OSS among higher education's IT leadership?

What OSS is currently **deployed** within academic institutions?

What level of **development** is underway within academic Institutions?

What **campus roles** are active in support of educational technology?

Current Co-Authors
(Invitations Remain Open)



THE CAMPUS COMPUTING PROJECT

www.campuscomputing.net October, 2006

The 2006 National Survey of Information Technology in U.S. Higher Education

Wireless Networks Reach Half of College Classrooms; IT Security Incidents Decline This Past Year

Wireless networks now reach fully half (51.2 percent) of college classrooms compared to just over two-fifths (42.7 percent) in 2005 and a third (31.1 percent) in 2004, according to new data from the annual Campus Computing Survey.

Additionally, more than two-thirds (68.8 percent) of campuses participating in the annual survey have a strategic plan for deploying wireless as of fall 2006, up from 64.0 percent in 2005 and 53.3 percent in 2004. By sector, the proportion of classrooms with wireless access ranges from a third (31.7 percent) in community colleges (up from 26.8 in 2005) to almost two-fifths (38.0 percent) in private research universities (compared to 52.8 percent in 2005 and 47.4 percent in 2004).

"Wireless is a great thing," says Kenneth C. Green, founding director of The Campus Computing Project and a visiting scholar at The Claremont Graduate University in Claremont, CA. "It fosters access, mobility, and collaborative work among students and faculty." But Green notes that there is evidence of backlash against wireless from some faculty who would prefer that students not hide behind their computer screens during class.

Data from the 2006 survey reveal that fully three-fifths (60.5 percent) of colleges and universities increased their campus IT budgets for wireless for the current academic year. Green identifies several factors as catalysts for the rising campus investment in wireless networks: the reduced cost and increased performance of wireless technology; the shifts in student (and consumer) purchasing preferences from desktop to notebook computers; and the appeal and benefits of mobility for students and faculty.

Green also notes that the expansion of wireless networks on campus mirrors the explosive growth of wireless in the consumer and corporate sectors over the past three years. "Households that have high-speed Internet access also typically have wireless networks," says Green. Consequently, "it should be no surprise that students and faculty come to campus expecting their college or university to provide the same wireless connectivity that they experience in their homes."

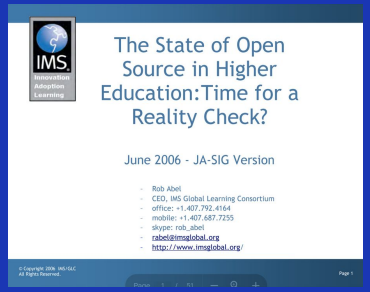
The 2006 survey indicates that campus IT officers continue to view network and data security as the "single most important information technology issue confronting their institution" over the next two-to-three years. This is the

Wireless Classrooms, 2004-2006

Single Most Important IT Issue

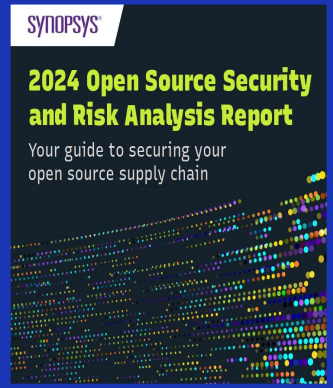
"National Survey of Information Technology in U.S. Higher Education." K. C. Green, Campus Computing Project, 2004-2019.

"CIO Constituent Group Survey on Open Source." S. E. Siddall, EDUCAUSE, 2004.



"The state of open source software in higher education: Time for a reality check." R. Abel, IMS Global, 2006.

"Opening Doors with Open Source: The Case for Modernizing Federal Agencies with Enterprise Open Source Software." Carahsoft, Coalition for Enterprise Open Source Software for Government, and Government Business Council, 2023.



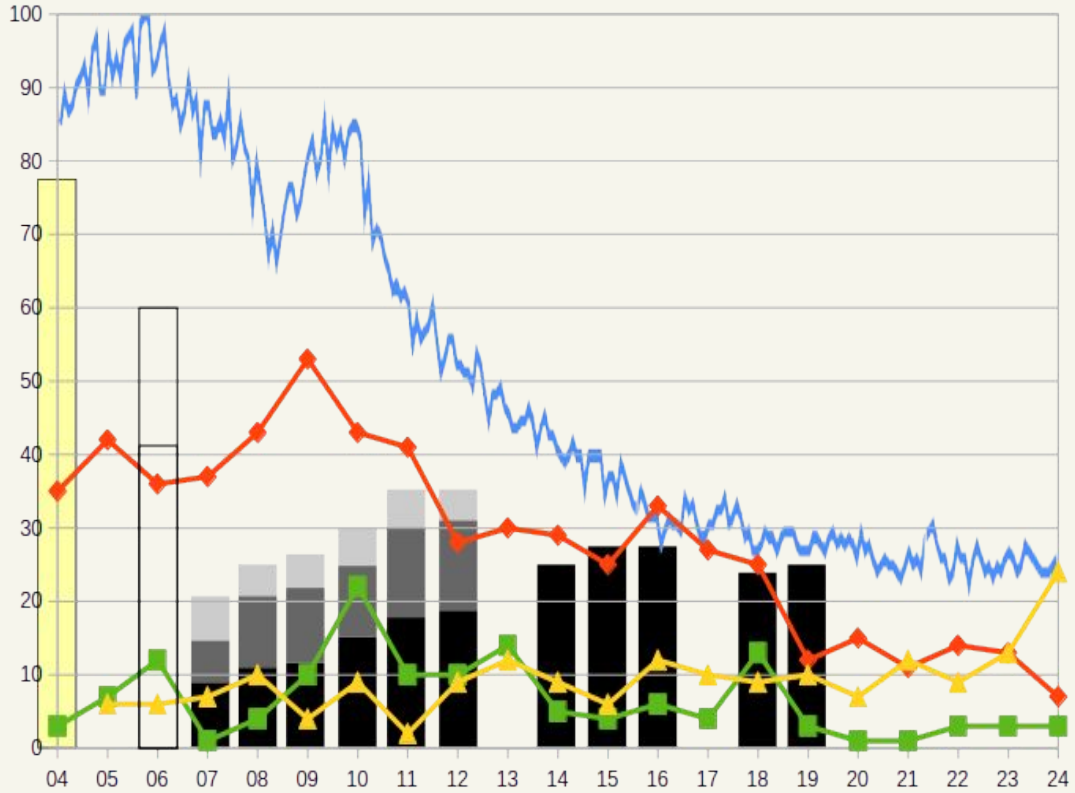
"Open Source Security and Risk Analysis Report." Synopsi, 2024.

Prior Work: OSS Surveys

Prior Work

Engagement (development, adoption, contribution) with open source with higher education.

- Google Trends
- EDUCAUSE Content
- EDUCAUSE Conference Sessions
- EDUCUASE Survey
- IMS Global
- Campus Computing Project
- Google: "'open source' site:.educause.edu"



Campus Computing Survey: https://www.campuscomputing.net/content/2008/10/29/the-2008-campus-computing-survey
Educause Conference Proceedings Data: https://events.educause.edu/annual-conference/2004/proceedings
Educause Content: https://www.educause.edu/search?contentTypeDisplay=Article&q=%22open+source%22&sortBy=publicationdate_search&sortOrder=desc&page=60
Educause Survey: https://www.educause.edu/ir/library/html/CSD3488.html
Synopsis: https://www.gcomtw.com/mailshot/Synopsys/2303BlackDuck/repossra2023FINAL.pdf

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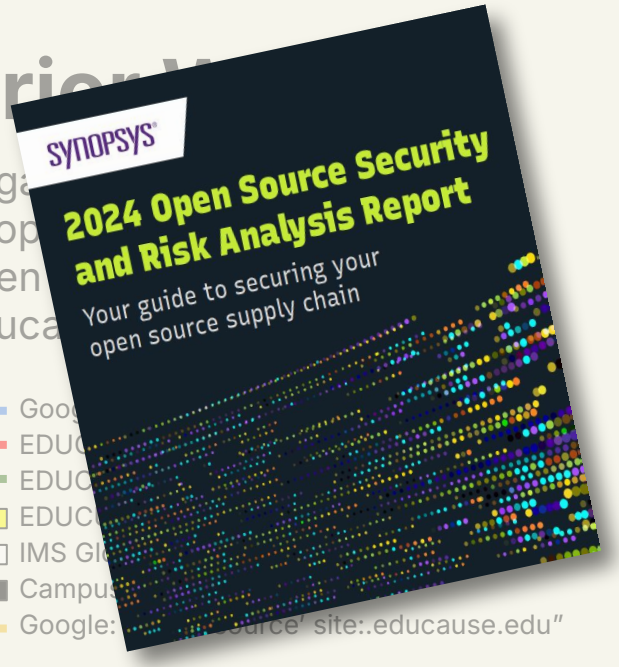
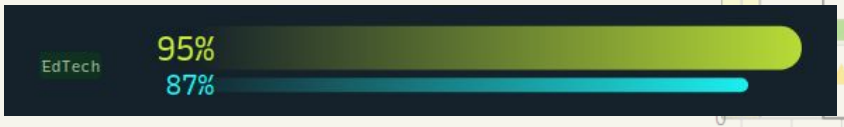
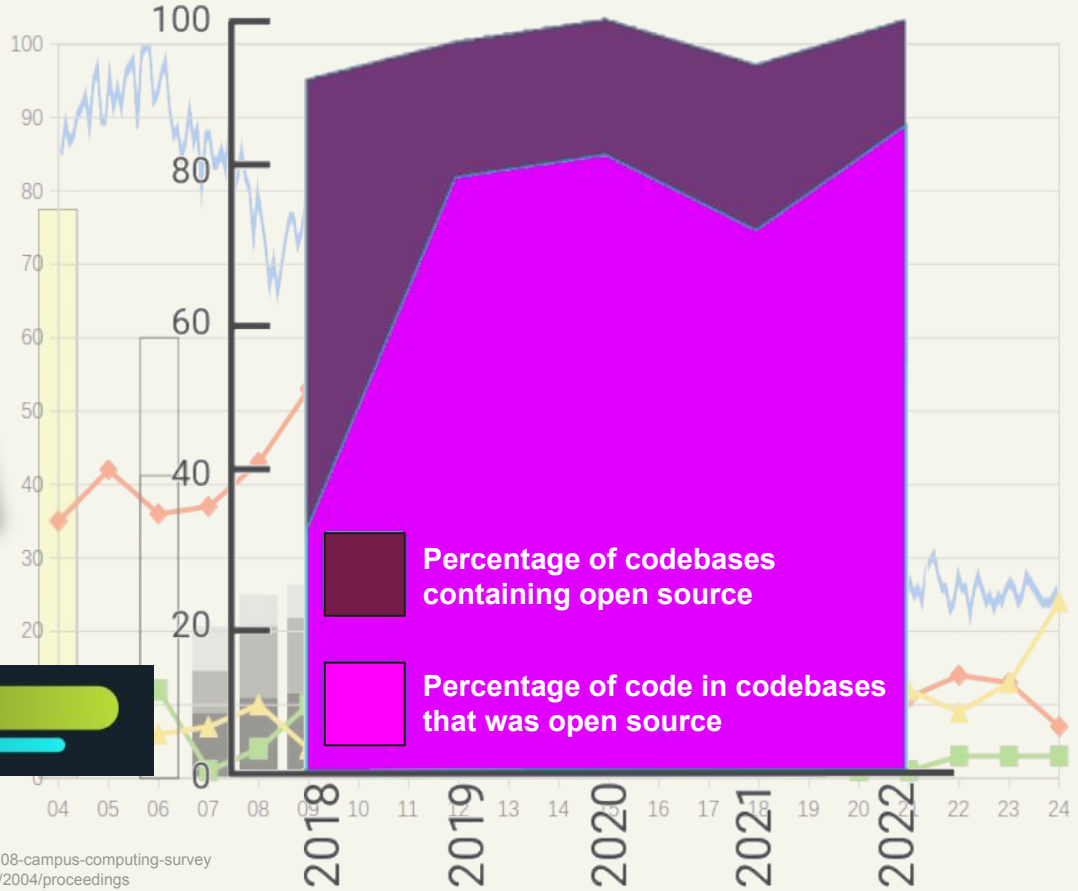




EDTech Software



Campus Computing Survey: https://www.campuscomputing.net/content/2008/10/29/the-2008-campus-computing-survey
Educause Conference Proceedings Data: https://events.educause.edu/annual-conference/2004/proceedings
Educause Content: https://www.educause.edu/search?contentTypeDisplay=Article&q=%22open+source%22&sortBy=publicationdate_search&sortOrder=desc&page=60
Educause Survey: https://www.educause.edu/ir/library/html/CSD3488.html
Synopsis: https://www.gcomtw.com/mailshot/Synopsys/2303BlackDuck/repossra2023FINAL.pdf

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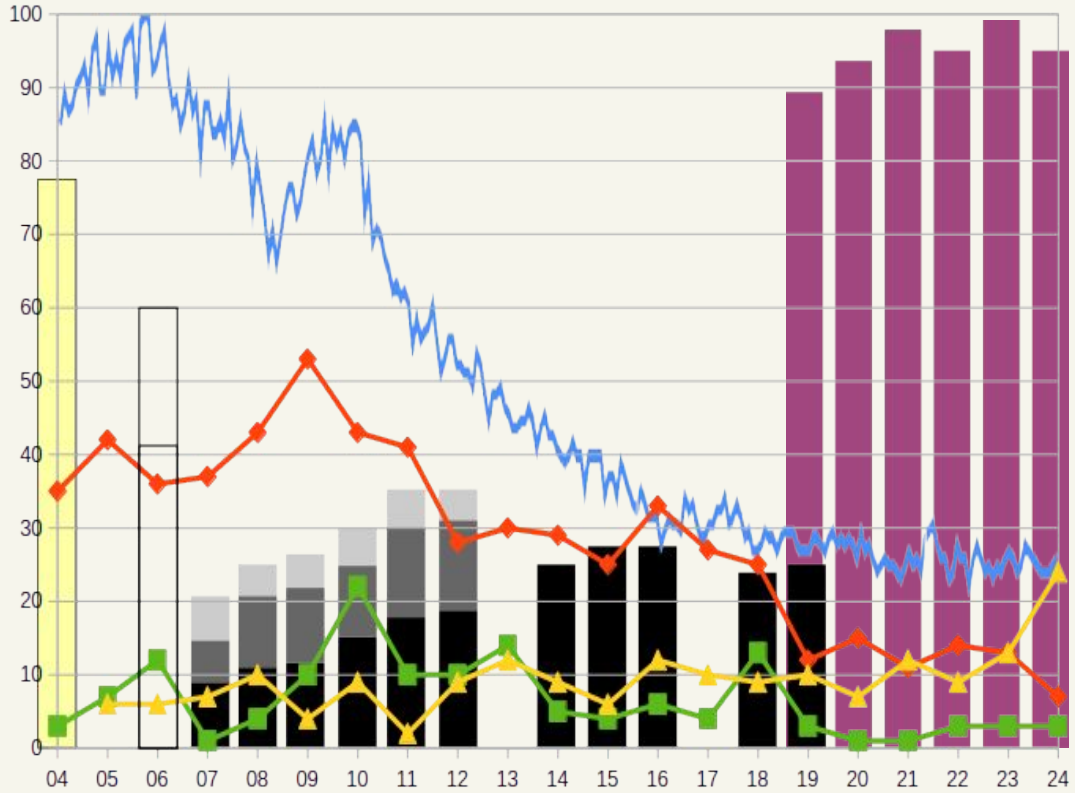

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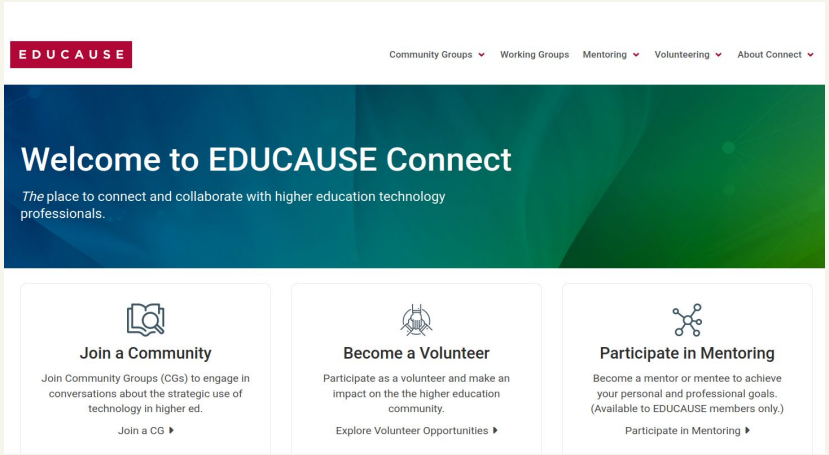
How much Open Source Software are campuses using?

Preliminary Report: Sample Data

EDUCAUSE: A nonprofit association focused on advancing higher education through the use of information technology.

- Over **1,800 member institutions**, primarily colleges and universities across the U.S. and globally.
- Includes community colleges, liberal arts institutions, research universities, and education system offices.
- Also includes corporate, nonprofit, and government partners involved in educational technology.
- More than **100,000 active professionals**.
- Roles span CIOs, instructional technologists, IT staff, faculty, researchers, and academic administrators.
- Strong representation from leadership, mid-career professionals, and emerging tech talent in higher education.

EDUCAUSE hosted its 2024 Annual Conference Oct. 21-24 in San Antonio, Texas.Abby Sourwine



Preliminary Report: Sample Data

- The OSSHE survey was conducted October 15th - 25th, 2024 to coincide with the EDUCAUSE Annual Conference.
- Solicitation occurred via EDUCAUSE's "Openness" and "CIO" Community Group discussion forums (4300 members), 2,465 attendees with 59 respondents.
- Participants included Central IT Staff/Administrators (25.4%), Faculty/Researchers (23.7%), Central IT Directors (13.6%), CIO/CTO (11.9%), other campus IT Directors; Libraries, Continuing Ed, etc. (10.2%).
- Institutional make-up included Doctoral University (79.7%), Master's College or University (8.5%), and Baccalaureate Colleges (8.5%); 62.7% Public, 37.3% Private.

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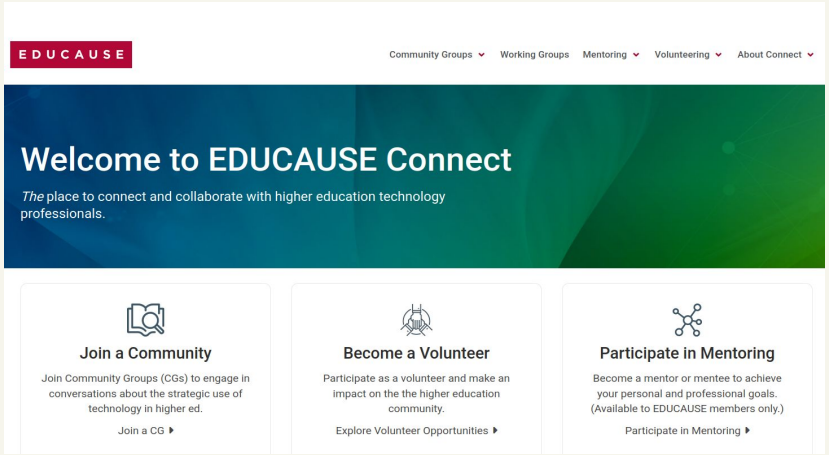


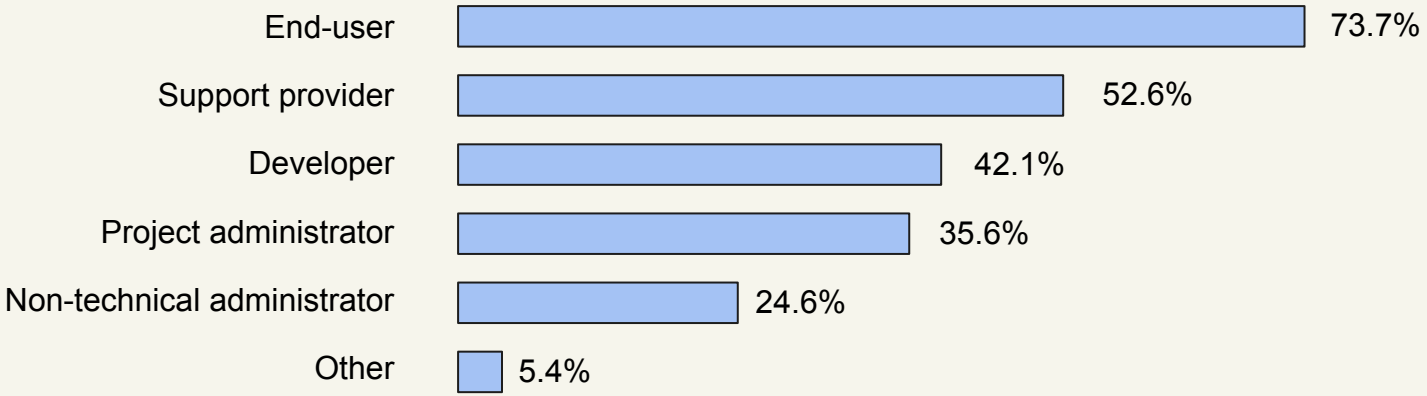
Preliminary Results

Respondent Profile

Did we ask the right people?
Were any findings of interest?

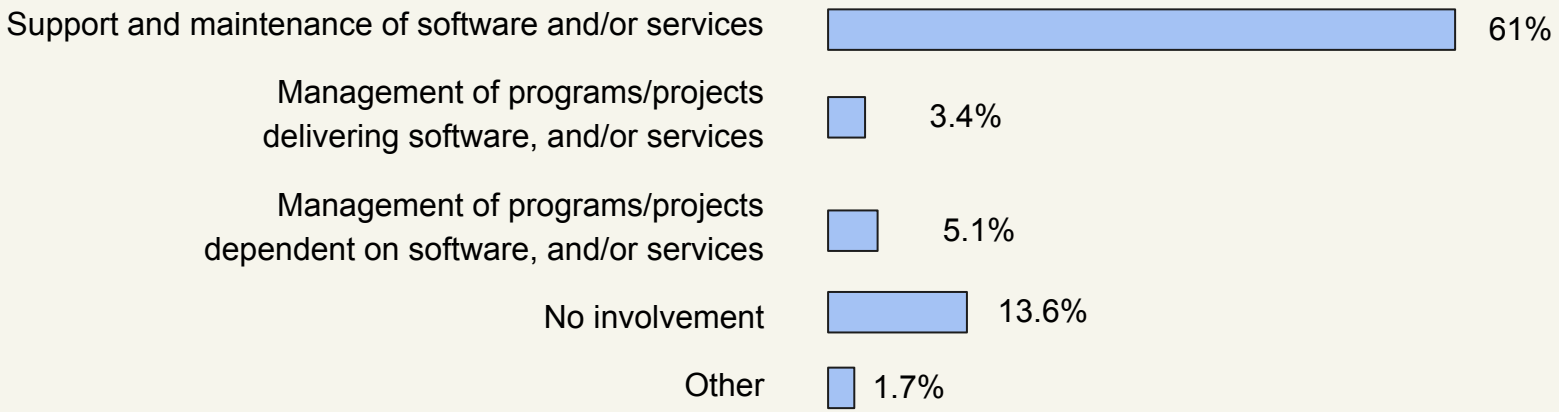
Respondent Profile

Throughout the 2023-2024 academic year, **which open source role(s) did you play** within your institution?



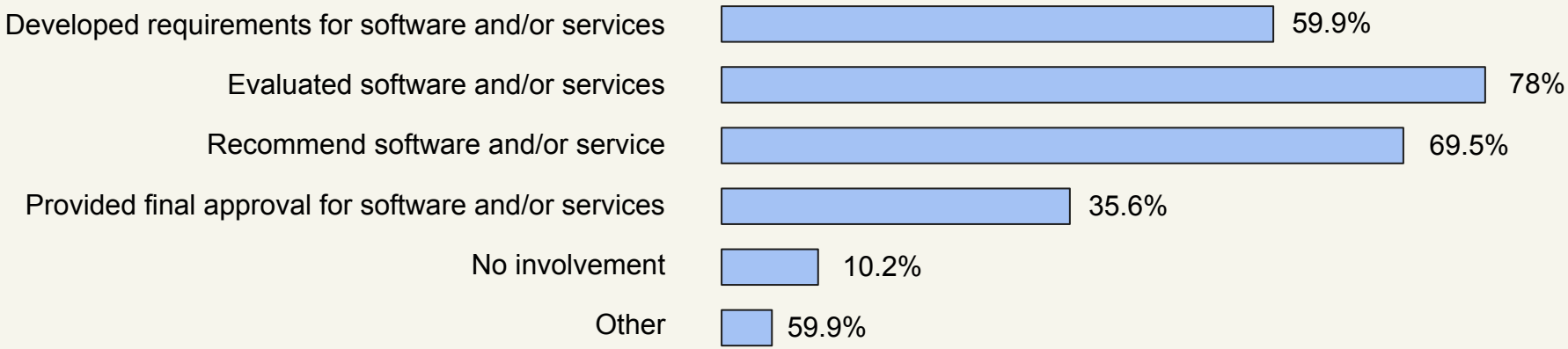
Respondent Profile

Throughout the 2023-2024 academic year, in which of the following ways **were you involved in the delivery** of your institution's IT products, software, or service providers?



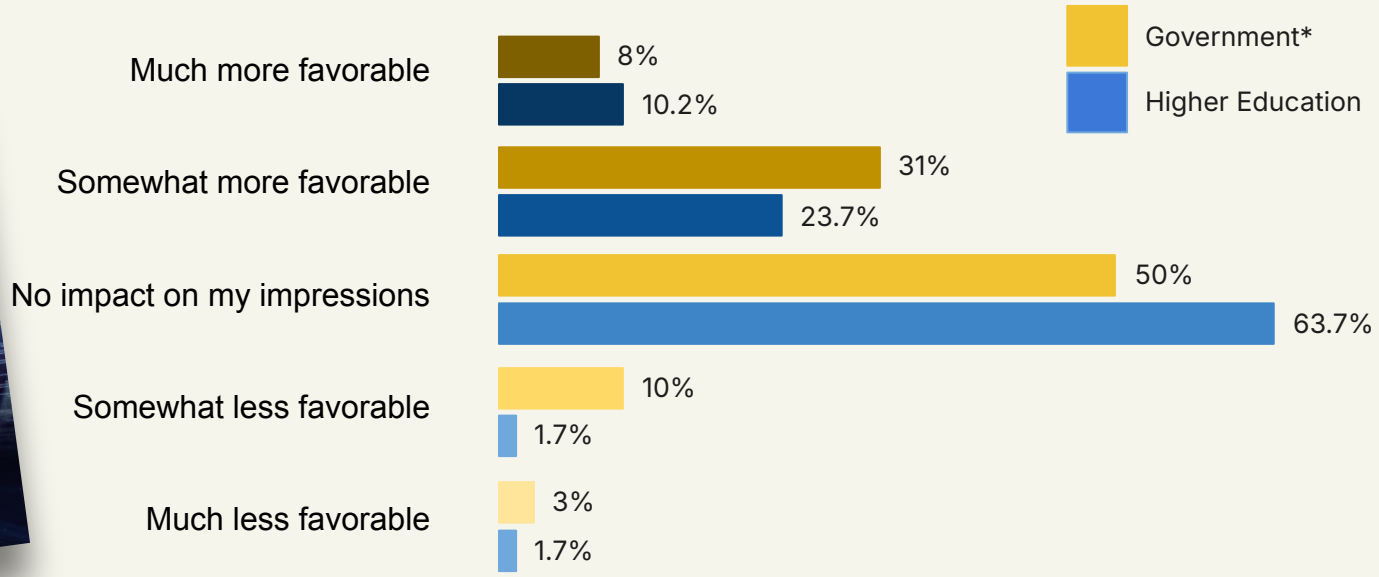
Respondent Profile

In which of the following ways throughout the 2023-2024 academic year **were you involved** in **your institution's selection** of IT products, software, or service providers?



Respondent Profile

How have your impressions of open source solutions changed over the past 12 months?



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Highlights: Higher Ed Profiles

Respondents had broad experience with a variety of OSS communities.

Over 50% of respondents were involved in either the technical or operational support of OSS.

Over 60% of respondents were involved in key roles in identifying OSS.

While a majority indicated their impressions of OSS have not changed, 64%, only 3% decreased.

Respondent profiles suggest **a mature and deeply embedded use of open source software across organizations**. The high level of end-user engagement, coupled with broad experience across community roles, points to a workforce that is not only using OSS but actively shaping and supporting it. The strong presence of respondents in support and maintenance roles reflects a recognition that **OSS requires ongoing investment, not just adoption.** Interestingly, the large share of respondents involved in software selection indicates that open source stakeholders increasingly hold strategic influence, challenging the notion that OSS adoption is bottom up.

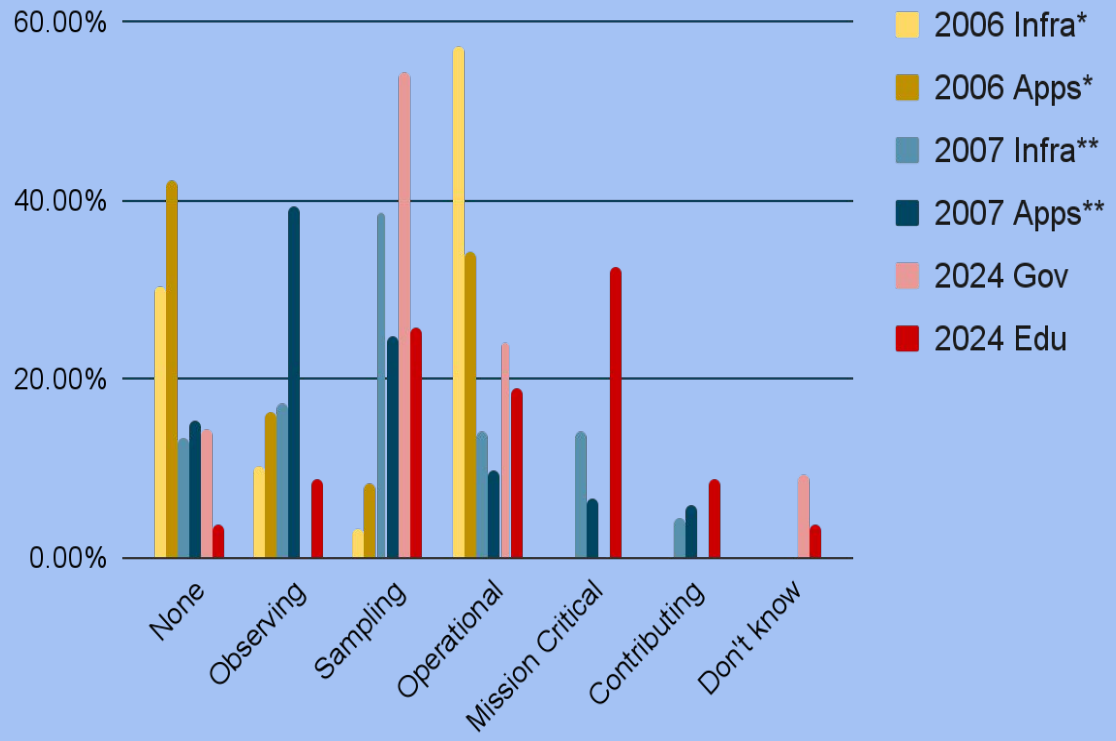
Preliminary Results

Institutional Landscape

Did we ask the right institutions?
Were any findings of interest?

Current Institutional Landscape

What was the deployment status of/engagement with open source software, generally, at your institution?

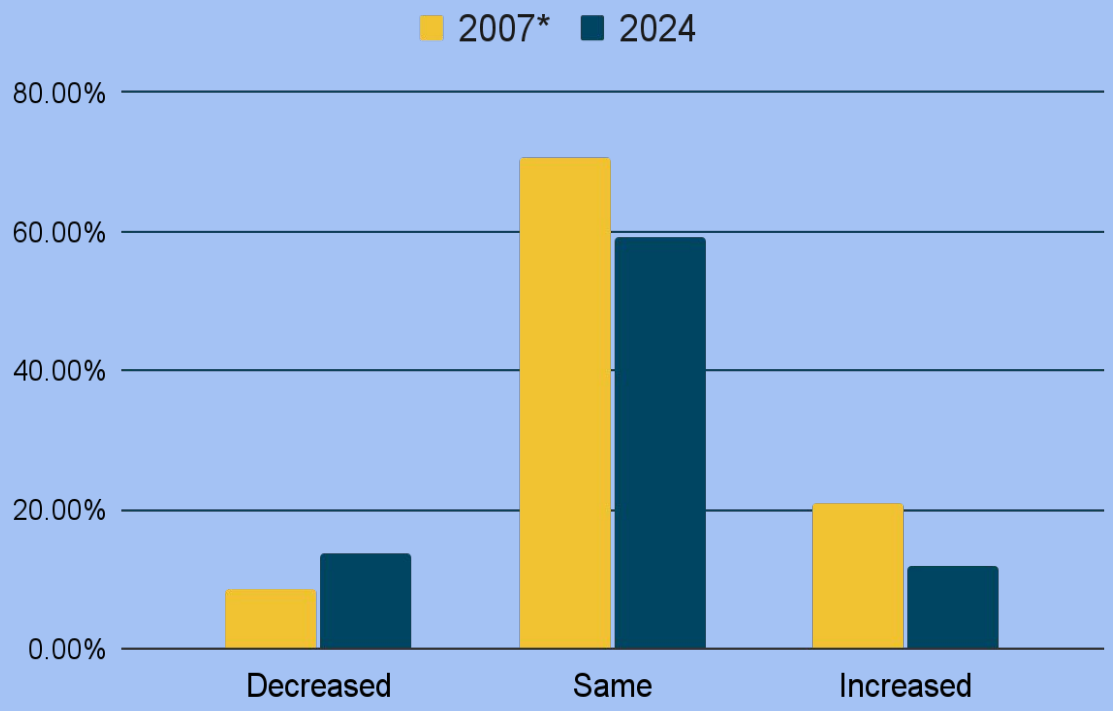


* K. C. Green, "The 18th National Survey of Computing and Information Technology in American Higher Education," Campus Computing Project, Encino, CA, USA, October, 2007. Accessed: April 15, 2024. [Online]. Available: https://static1.squarespace.com/static/5757372f8a65e295305044dc/t/5b8e7735032be4d3b7ede0b8/1536063294329/Campus+Computing+-+2007+Report.pdf

**R. Abel. (2006). The State of Open Source in Higher Education: Time for a Reality Check? [PDF file]. Available: https://drive.google.com/file/d/1LdVRFjiwRatBffl4qTEOxEq66qtC1z3C/view?usp=drive_link

Current Institutional Landscape

During the 2023 - 2024 academic year, annual investment in open source software at your institution...



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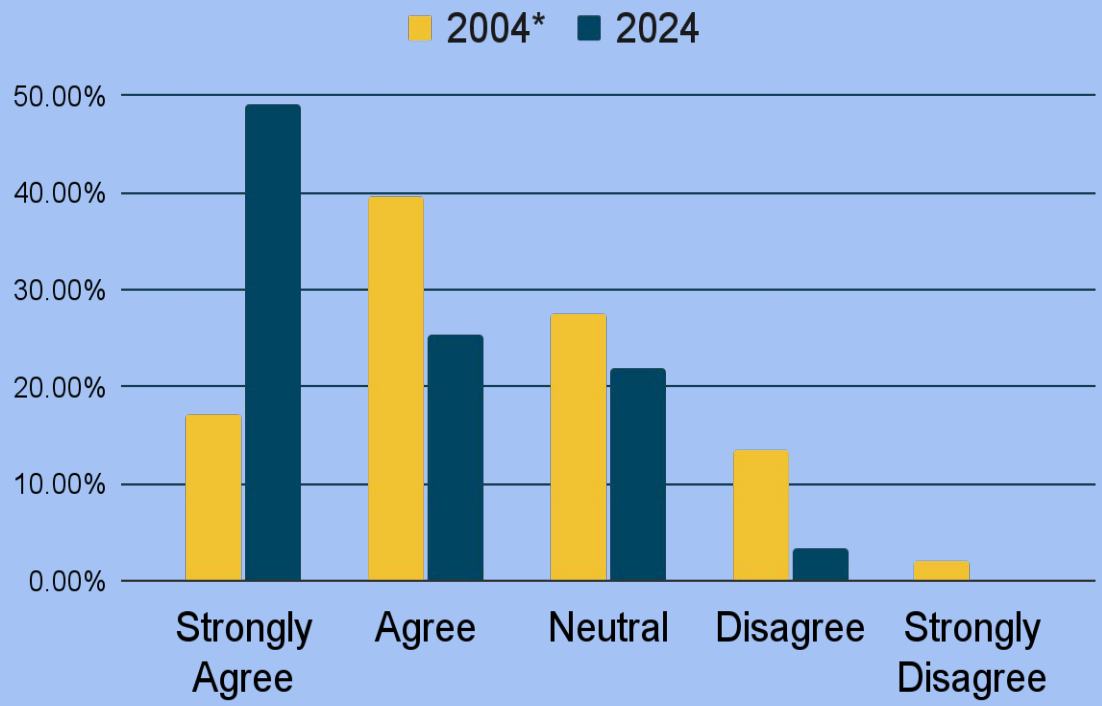
Current Institutional Landscape

It is important that academic and research institutions create open source software to meet unique needs.



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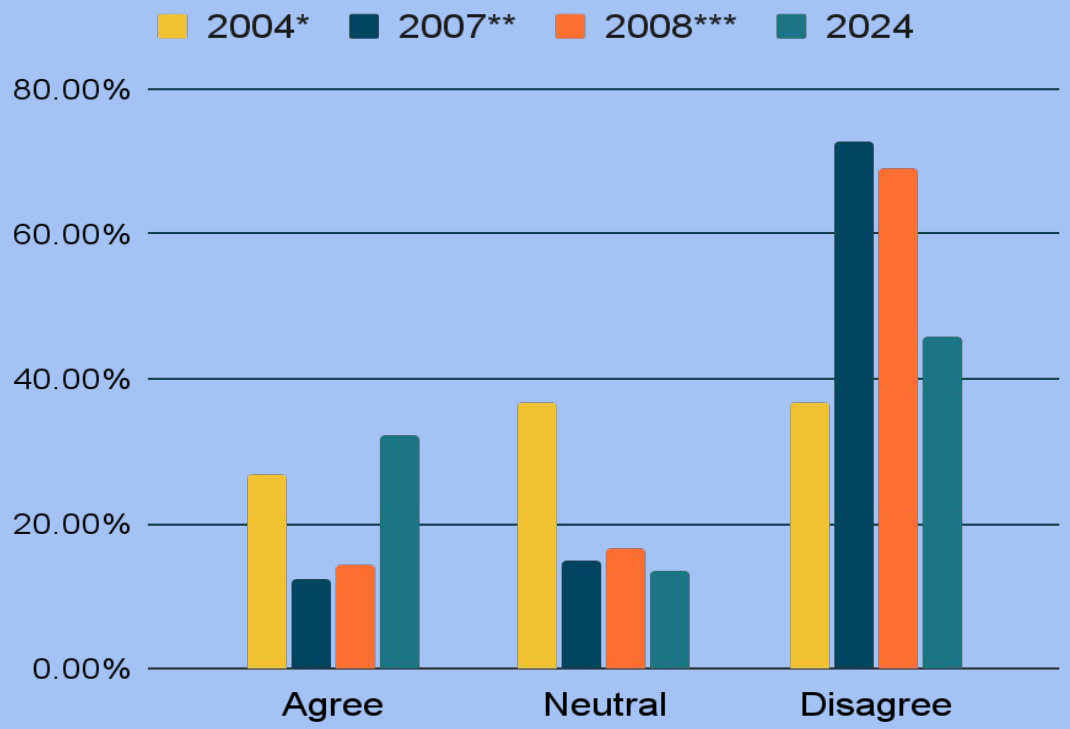
Current Institutional Landscape

Your institution had a clear IT strategy regarding the use (deployment or development) of open source software.



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** K. C. Green, “The 18th National Survey of Computing and Information Technology in American Higher Education,” Campus Computing Project, Encino, CA, USA, October, 2007.
*** K. C. Green, “The 19th National Survey of Computing and Information Technology in American Higher Education,” Campus Computing Project, Encino, CA, USA, October, 2008.

Highlights: Higher Ed Landscape

Only 3.4% of respondents report no OSS in production.

2024 Investment in OSS mirrored investments of 2007

OSS is important for academic and researcher's unique needs.

Do not know of/do not have an IT strategy for open source software.

While campuses have implemented open source software across the enterprise—including for mission-critical services—and agree open source software can meet the unique needs of academia, most respondents indicated their **campuses do not have an IT strategy regarding the use (deployment and development) of open source software** for academic, administrative, or research initiatives.

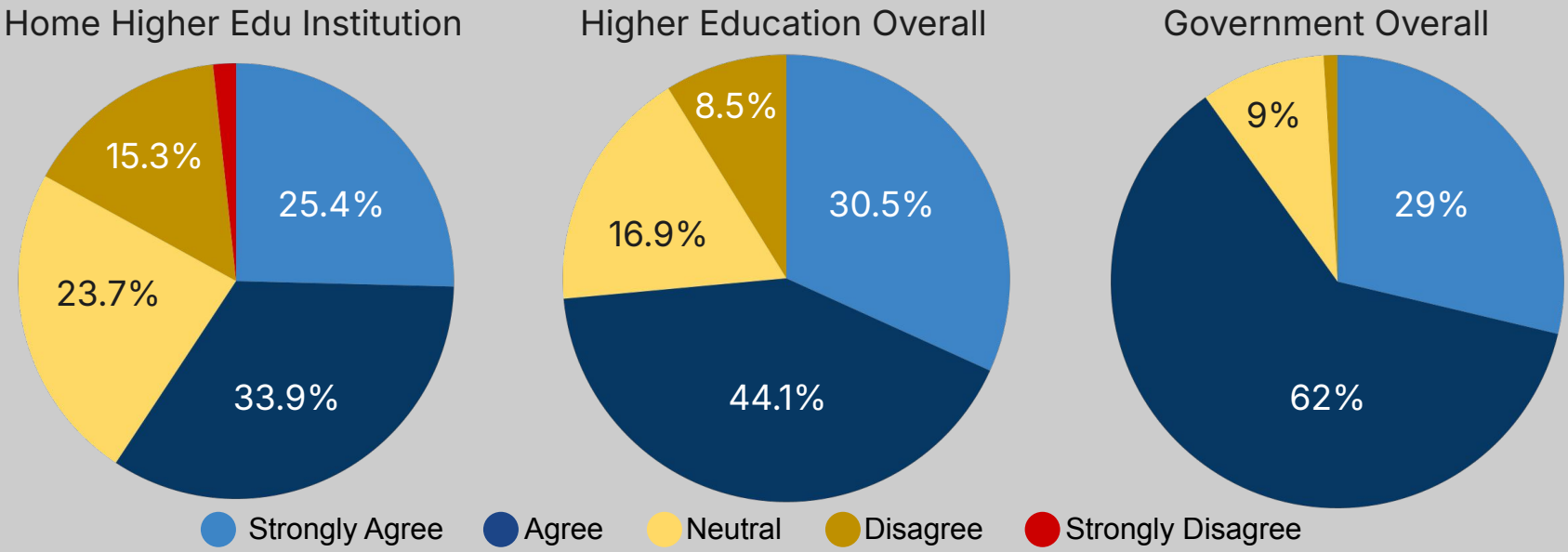
Future Impact

Institutional Landscape

Did we ask the right institutions?
Were any findings of interest?

Future Impact

Looking ahead to the next three to five years, open source software will play an **increasingly important** role within academic and research institutions.



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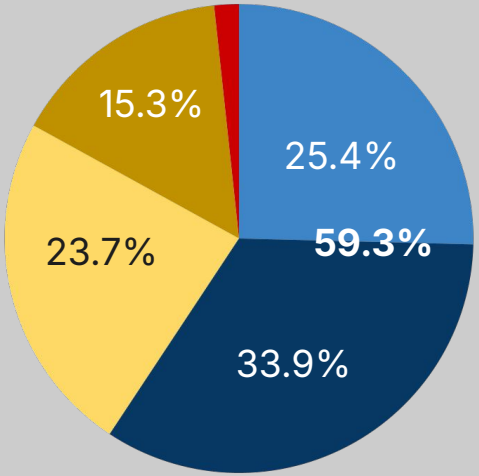
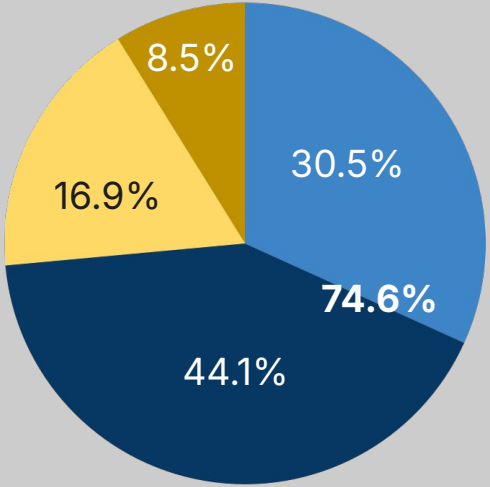
Home Higher Edu Institution



Higher Education Overall



Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree

2004 & 2007

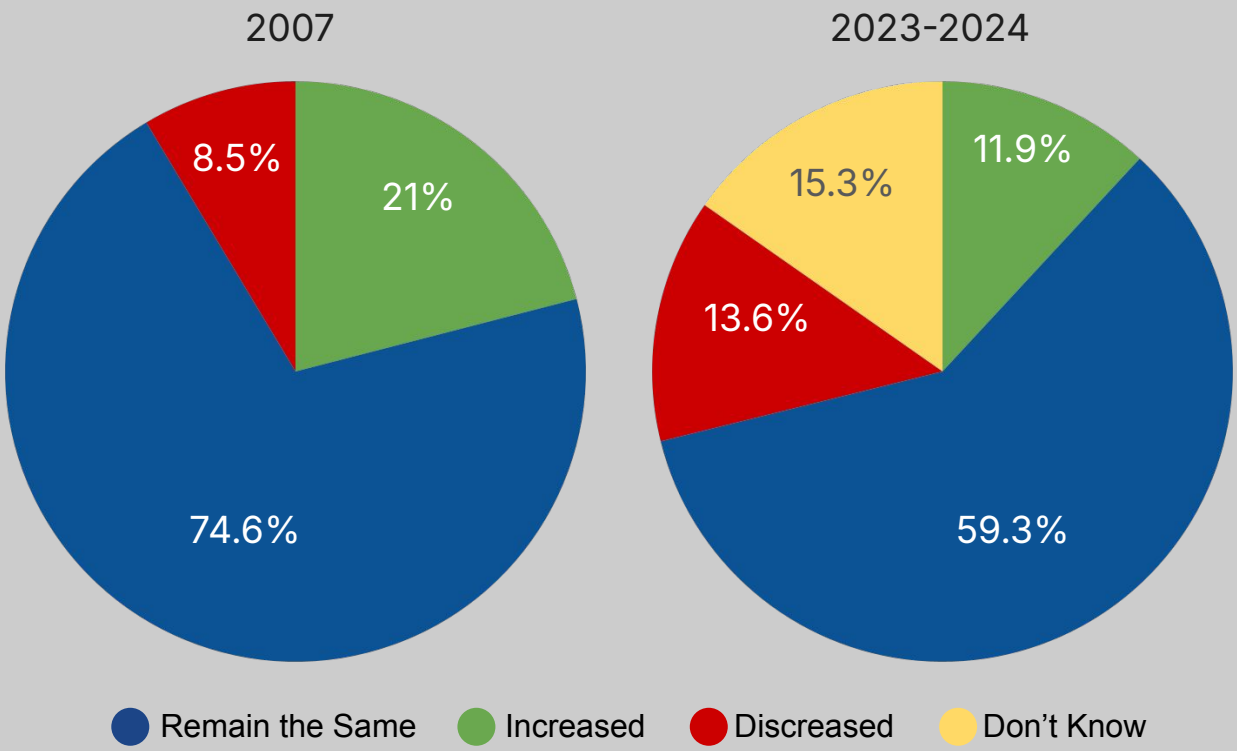
Almost three-fifths (**57.3%**, compared to **51.9%** in 2004) agree that "Open Source will play an increasingly important role in our campus IT strategy."

- 2007 National Survey of Computing and Information Technology in American Higher Education

* K. C. Green, "The 18th National Survey of Computing and Information Technology in American Higher Education," Campus Computing Project, Encino, CA, USA, October, 2007.

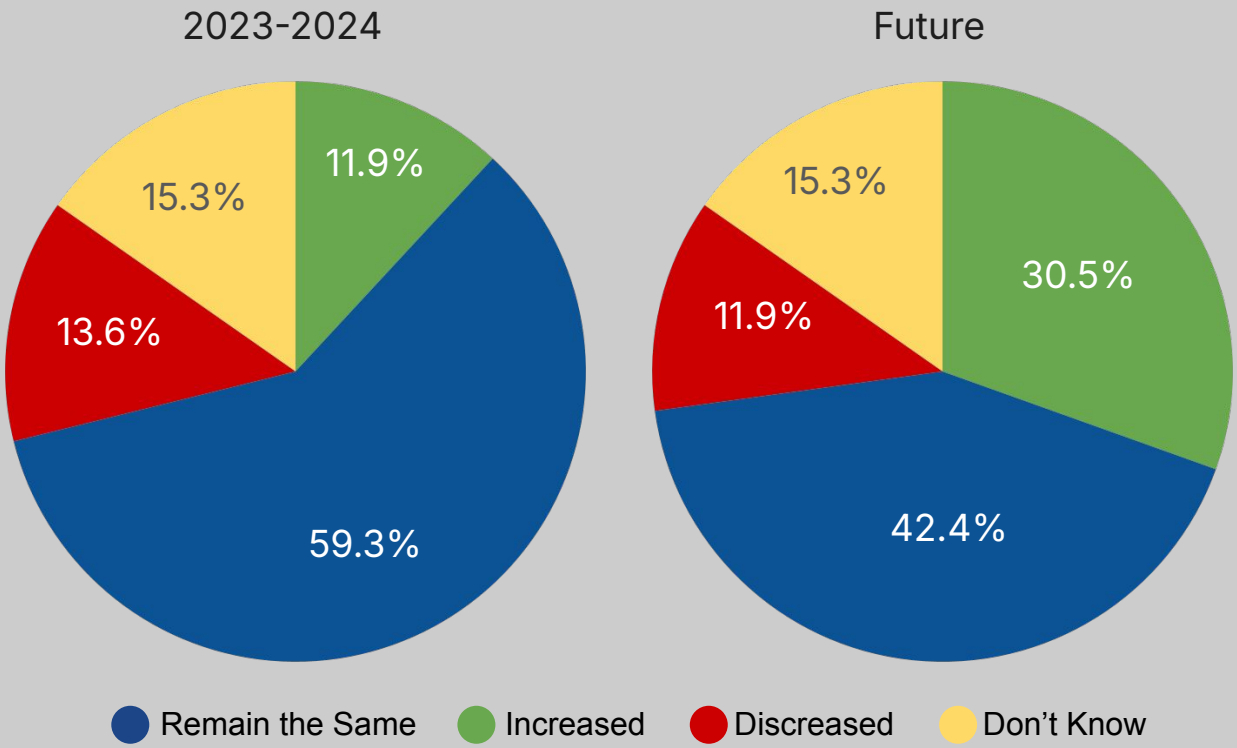
Future Impact

Investment in open source software (deployment, support, or development) **2007 vs. today (2024)**.



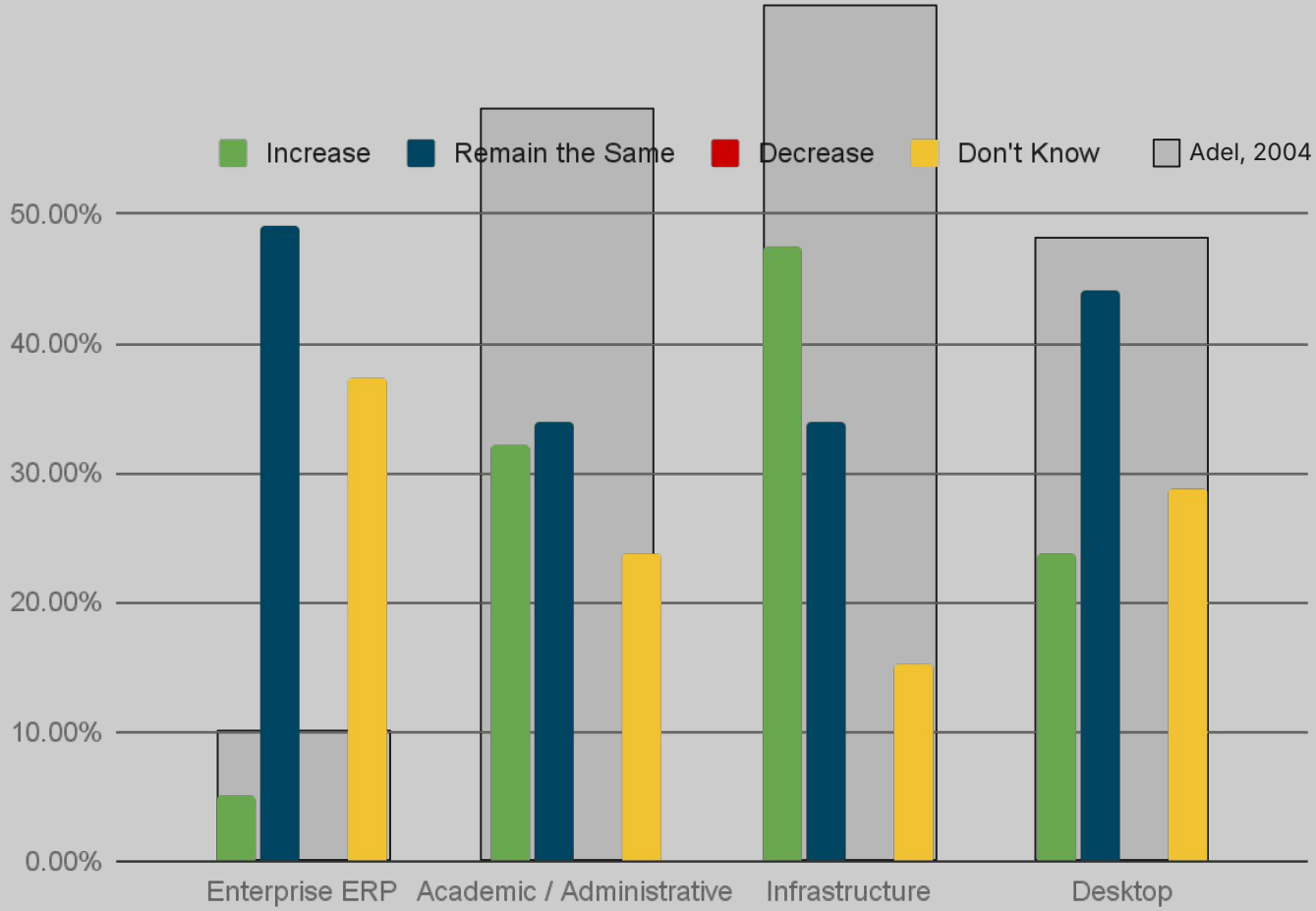
Future Impact

Investment in open source software (deployment, support, or development) **today (2024) vs. in the future**.



Future Impact

Looking ahead to the next three to five years, the **software systems or services most impacted** by open source will be:



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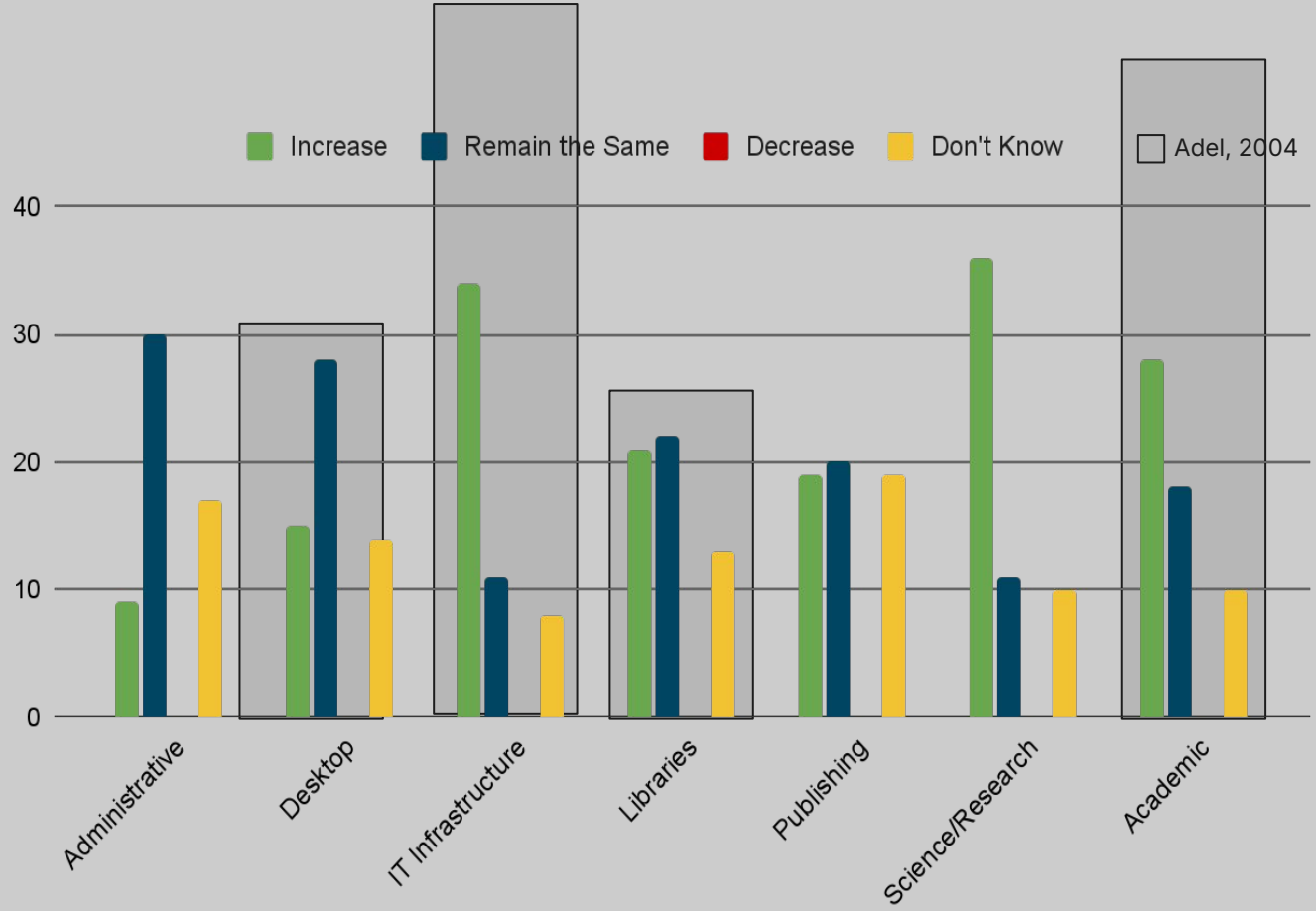
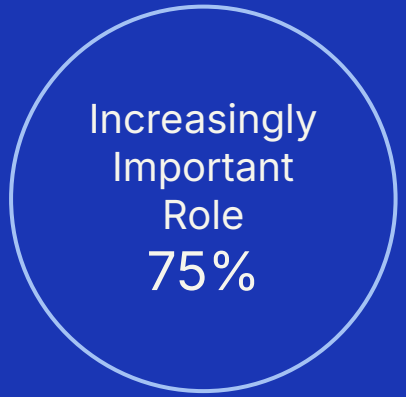
Future Impact

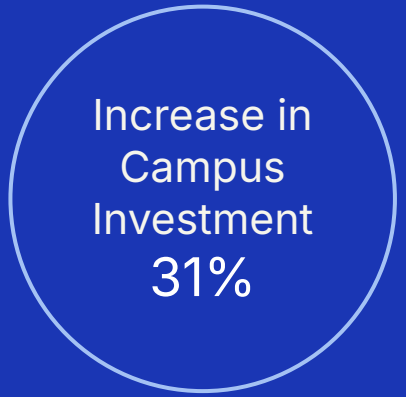
Looking ahead to the next three to five years, the **institutional areas** most impacted by open source software will be:



Highlights: Higher Ed Future



Most see OSS growing in higher education broadly, but are less optimistic about its role on their own campuses



Respondents expect increased investment in the future compared to today, 1.9% to 30.5%, but with total commitment consistent.

Today's respondents more optimistic than 2007's that OSS will play an increasingly strategic role.

No decrease in use expected across academic areas services.

Open source software is prevalent across institutions of higher education and expected to grow. Technologies deployed span the academic mission, varying from core infrastructure within campus data centers to publicly facing services such as content management systems, e-learning platforms, and research technologies. Considering all institutional program areas **zero percent of respondents forecast a drop in open source development or adoption.**

Institutional Audit

Development & Adoption

Is the approach sound?
What can be inferred?

Enterprise Software

Built With
The primary data source is the BuiltWith dataset, from which we leverage scans of **348,708 websites** to identify the underlying technology deployed by **5,259 .edu domains**.

BuiltWith data has been used in multiple academic studies (DeStefano & Timmis 2023, Dushnitsky & Stroube 2021, Koning et al.. 2022), but to our knowledge the first to focus on OSS usage was (Hoffmann, Nagle, & Zhou, 2024)

OpenLogic
OpenLogic & Open Source Initiative 2024 Open Source survey used to identify most popular open source software in use.

Enterprise Software Identified

Alpine.js
AMP
Apache HTTP Server
ApostropheCMS
Backdrop CMS
BigBlueButton
Bootstrap
Caddy
Chamilo
CiviCRM
CKEditor
Concrete5
Contao
Discourse
Django
Drupal
ERPNext
Foundation
Gatsby
Ghost
GitLab
Grafana
Handlebars.js
Hugo
Jekyll
Jenkins
Joomla
jQuery
Kibana
Laravel
Leaflet
Less.js
LimeSurvey
Lodash
Magento
Matomo
(formerly Piwik)
Mautic
MediaWiki
Modernizr
MODX
Moodle
Mustache
Next.js
Nginx
OctoberCMS
Odoo
Open Web Analytics
OpenCart
OpenCart
OpenLayers
osCommerce
Parse Server
phpBB
phpMyAdmin
Plone
Preact
PrestaShop
React
Ruby on Rails
SilverStripe
Snipe-IT
Sphinx
Squid
SuiteCRM
Sylius
TensorFlow
Three.js
TYPO3
Umbraco
Varnish
Vue.js
VuePress
Webpack
WooCommerce
WordPress
Zen Cart

Enterprise Software

1. jQuery: 4,329
2. WordPress: 2,746
3. Apache: 2,662
4. NGINX: 2,062
5. PHP: 1,941
6. React.js: 1,173
7. Lodash: 963
8. Javascript: 822
9. WebPack: 798
10. Angular JS: 685
11. Vue: 670
12. Moodle: 664
13. Handlebars.js: 454
14. Drupal: 439

Total sites scanned: 348,708
Total .edu sites scanned: 5,259 (Sep 29, 2024)
Total .edu sites using open source: 4,682 (89%)

Highlights: Higher Ed Adoption

Campuses Using Open Source
89%

A scan of 348,708 sites revealed 5,259 .edu domains, of which 4,682 run at least one open source technology.

Most Popular Open Source Technology, JQuery
92%
(4,329)

The next top five include WordPress (2,746), Apache: (2,662),NGINX (2,062), PHP (1,941), and React.js (1,173).

Open Source Installations
26,306

Number of unique installations running across .edu domains; averaging six per campus.

Different Open Source Technologies Detected
74

Of the 76 open source technologies quired, 97% were detected on at least one campus.

Open source software is prevalent across institutions of higher education and expected to grow. Technologies deployed span the academic mission, varying from core infrastructure within campus data centers to publicly facing services such as content management systems, e-learning platforms, and research technologies.

Highlights: Comments

IT departments at their universities seem too overwhelmed to be viable partners...

...presumes universities have strategic goals related to OSS and that the value of sustaining research OSS therefore aligns with institutional priorities...

OSS projects may have primary stakeholders other than the university, and therefore need to orient their sustainability approaches to a recognition that a "host" university may view research OSS through a very different lens than the project owners.

...[how] to meet the unique needs of distinct research communities that can easily exist in isolation from each other... "How to fix?"

Research oriented OSS, tends towards highly specialized applications designed to meet the unique needs of distinct research communities that can easily exist in isolation from each other and which taken individually may struggle to attract sustained attention from the university.

To date, the potential benefits of such a comprehensive ecosystem have been limited by a siloed approach that engages only one or two components of the higher education system.

Key Takeaways

Experienced open source stakeholders actively influence enterprise-level decisions, challenging the traditional view of OSS adoption as purely grassroots

Respondent profiles suggest a **mature and deeply embedded** use of open source software across organizations.

The percentage of respondents with OSS experience involved in software selection indicates that open source stakeholders hold enterprise influence, **challenging the notion that OSS adoption on campuses is bottom up.**

Key Takeaways

Despite current and increasing adoption of OSS, campus lack open source IT management strategies.

While respondents cite active and **increasing adoption** (primarily in “mission critical” services), **unique value** for development, and a **positive perception** in line with other industries, **campuses do not have an IT strategy regarding the use of open source software**.

Key Takeaways

OSS is used across the enterprise, often, in the institutions' most publicly facing services.

Open source software is prevalent across institutions of higher education and expected to grow.

Technologies deployed span the academic mission, varying from core infrastructure within campus data centers to publicly facing services such as content management systems, e-learning platforms, and research technologies.

Key Takeaways

This initial survey indicates the need for a broader, more comprehensive study.

While the initial survey was limited in scope—drawing from a single organization with a small sample size and low response rate—the preliminary findings suggest that a more extensive survey with a broader participant base is warranted.

Known Issues

Preliminary findings provide early insights, but advancing this research requires broader peer collaboration and committed sponsor support.

Participants, representative?

- Co-Authors, maximizing engagement?
- Contributors, opportunities to collaborate?
- Sponsors, extending value?

Respondents

- Communities, comprehensive of edtech?
- Numbers, increasing participation?

Prior Work

- Peer communities, sufficient review?
- Other industries, assessing across sectors?

Thank you
& Discussion

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