INFORMATION TECHNOLOGY IN HIGHER EDUCATION

2017

EXECUTIVE SUMMARY

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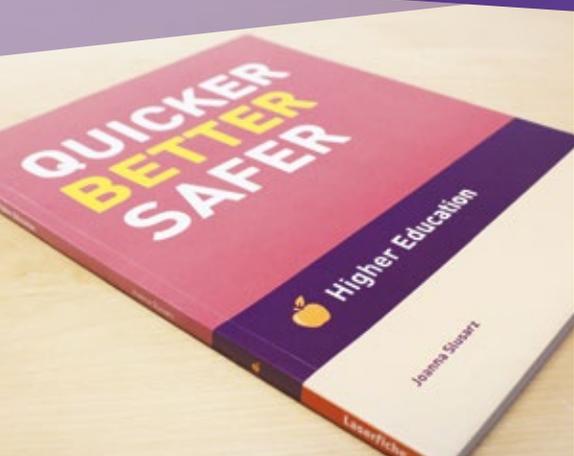
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ABOUT THE LBCIO

The Leadership Board for CIOs in Higher Education (LBCIO) Survey is a project of the LBCIO, led independently by Dr. Michael Zastrocky. When first fielded in 2010, the survey was a joint effort by Dr. Zastrocky and The Chronicle of Higher Education, Inc. Dr. Zastrocky publishes this global survey to provide CIOs with key metrics to help them do the work of managing and planning IT for their institutions.

INTRODUCTION

This report, the eighth annual global LBCIO survey of Chief Information Officers (CIOs) in higher education, provides us with a few new insights and changes in how we look at the evolving role of the CIO in higher education. We made a few changes in the survey based on feedback from LBCIO members and respondents to previous surveys: The issue of consumerization is so embedded in higher-education culture today that we kept only a few questions and dropped the section on MOOCs due to prior results that indicate low interest in the questions—but this time around, we added a few questions on video surveillance. While budget concerns remain a key issue for CIOs, according to the EDUCAUSE 2017 Top 10 IT Issues, information security is the number one concern again this year. We added a few questions to look at malware and ransomware, and the results show CIOs are very concerned and are putting more resources into security issues. However, as one LBCIO board member said at a meeting, "It seems that the bad guys are getting smarter faster than we are!"

The LBCIO survey provides key metrics to help CIOs manage and plan IT for their institutions. Results from the survey are shared only in the aggregate, and all CIOs who complete the survey receive a copy of the annual report. Survey results are not meant to provide market research or a detailed plan to follow, but simply to tell the story of what CIOs currently are doing and their thoughts about the future. The questions are asked in such a way to make it easy for CIOs to fill out the survey. For example, the survey doesn't ask for specific budget numbers but asks about budgets in general, with questions such as "Is your IT budget increasing, decreasing, or staying the same?" The responses provide important information for CIOs and other higher-education executives without getting into the actual budget numbers, which are often difficult to provide.

To get a picture of what's happening with IT on campuses today, LBCIO surveyed a broad range of colleges and universities in April and May of 2017, collecting strategic and tactical information on major issues higher-education CIOs are facing. The survey included questions on topics including:

- Characteristics of CIOs in higher education
- Financial and budget information for IT
- Organization and governance
- Personnel and staffing
- Consumerization
- Administrative computing plans
- Academic technologies and innovation
- Infrastructure and networking
- Security
- Plans for cloud computing and big data

Dr. Michael Zastrocky, Executive Director of LBCIO, was assisted by the following LBCIO members in the analysis of this year's survey results: Reid Christenberry, CIO Emeritus, Tennessee Technological University; Brian Cornell, CIO, Elmira College; Maureen Coughlin, Director of Client Services, Teachers College, Columbia University; Dr. Paul Czarapata, Vice President and CIO, Kentucky Community and Technical College System; Leonard De Botton, CIO and Vice President, Information Systems, Berkeley College; Dr. Jan Fox, CIO Emeritus, Marshall University; Dr. Doyle Friskney, CTO, University of Kentucky; Peter Greco, CTO, Saint Mary's College of California; Scott Howder, Assistant CIO, Cedarville University; Naveed Husain, CIO, Teachers College, Columbia University; Dr. Vince Kellen, CIO, University of California at San Diego; Don Mihulka, Associate CIO, University of Nebraska; Brigitte Mudukuti, Associate CIO and Director of IT, Texas Wesleyan University; Don Stinson, Director of Enterprise Systems, Northern Kentucky University; Dr. Tina Stuchell, Executive Director of IT, University of Mount Union; and Ben Zastrocky, Senior Advisor to LBCIO.

INSTITUTIONAL AND CIO CHARACTERISTICS

2017 Survey Respondent Demographics

The 2017 survey was sent to almost 1,000 CIOs globally, and the response rate was greater than 20 percent. The survey was conducted for a period of three weeks during April and May 2017.

As in prior years, CIOs from public institutions were the majority of the respondents (61 percent up from 54 percent in 2016) versus private, nonprofit institutions (38 percent down from 45 percent in 2016) and for-profit institutions (1 percent). This year the breakout by classification of institutions was as follows:

Research universities	26%
Doctoral-granting institutions	19%
Four-year institutions with master's degree	31%
Four-year institutions without master's degree	8%
Two-year institutions	16%

The size of the responding institutions varied, with 19 percent having enrollment of 3,000 students or less, 14 percent with 3,001-5,000 students, 17 percent between 5,001 and 10,000, 29 percent with enrollment of 10,001-25,000 students, and 21 percent at more than 25,000 students. The global breakout is as follows: North America, 89 percent; Europe, 5 percent; Australasia, 5 percent; South America, 1 percent and Africa, 1 percent.

CIO Responsibilities

Over the past five years, CIOs consistently reported their management scope included traditional core responsibilities for supporting administrative and academic applications, programming applications, helpdesk, networking, and tele-communications. This year's survey has shown a decline in library management responsibilities for the second year in a row. The percentage of CIOs responsible for research computing has stayed the same from last year while institutional research responsibilities increased from last year. As security continues to be high priority, it is not surprising that 99 percent of CIOs reported that IT security and disaster recovery is included in their scope of management. CIO responsibility for media services, including support of video services, rose this year with 75 percent reporting this in their scope of responsibilities, up from 67% last year.

CIO Characteristics

CIOs in higher education tend to be mature in age, and are getting older; overall, we saw a 4 percent increase over last year (48 percent) in the 55-and-older category. Thirty-six percent of CIOs are between the age of 45 and 55 years of age, while only 13 percent were between 36 and 45 years of age and just three percent were younger than 35 years old. Men continue to dominate the field, as the 2017 survey marks the lowest percentage (19 percent) of female CIOs since 2012 and a 5 percent reduction from last year's survey.

CIOs with a terminal degree continue to decrease. Twenty-nine percent of CIOs in 2014 possessed a terminal degree, but that number has declined to 22 percent in 2017. The reverse is true on the longevity as CIO. Since 2012, CIOs with 15 years or greater experience increased from 23 percent in 2012 to 31 percent over the last two years. CIOs reporting to the CEO (37 percent) continue to be the norm; changes over last year's survey include a 7 percent increase (27 percent) reporting to the Chief Financial Officer and a 2 percent reduction (16 percent) of CIOs reporting to the Chief Academic Officer.

Changes in CIO Characteristics by Gender

Female
- 23%
- 21%
- 22%
- 24%
- 19%

Male
- 75%
- 77%
- 77%
- 76%
- 81%

■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017

CIO Characteristics by Gender and Institutional Classification

Female

- 22%
- 8%
- 16%
- 20%
- 32%

Male

- 78%
- 92%
- 84%
- 80%
- 68%

- Research university
- Doctoral-granting institution
- Four-year with master's degree program
- Four-year institution only
- Two-year institution only

Highest Degree Attainment of CIO

Terminal degree (Ph.D., Ed.D., M.D., J.D., etc.)

- 27%
- 29%
- 25%
- 23%
- 22%

Master's degree

- 53%
- 56%
- 56%
- 64%
- 55%

Bachelor's degree

- 17%
- 14%
- 19%
- 14%
- 21%

- 2013
- 2014
- 2015
- 2016
- 2017

Various combinations of education, experience in the role, and knowledge influence CIO professional advancement opportunities. Seventy-seven percent of CIOs earned a master's or higher degree, while 3 percent of CIOs who responded do not hold a degree at all and 21 percent hold a bachelor's degree.
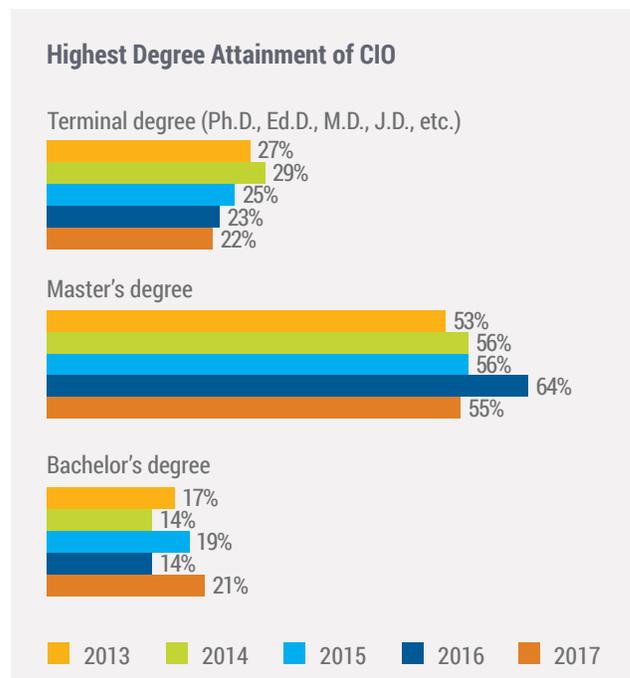
The size of the institution seems to be important regarding the CIO's degrees. At institutions with more than 25,000 students, 36 percent of CIOs had a terminal degree compared with only 15 percent at institutions with 3,001-5,000 students. At institutions having more than 10,000 students, 66 percent had terminal degrees. In small institutions with 3,000 students or less, 21 percent of the CIOs had only a bachelor's degree, 64 percent had master's degree, and only 15 percent had terminal degrees. The type of institution is also important with respect to degrees. Ninety-one percent of CIOs at research institutions hold a master's degree or above compared with four-year institutions, where only 75 percent hold master's degrees or higher.

This year's survey asked for the second year what types of activities are important for a CIO's professional growth and to increase his or her knowledge. Peer relationships and professional associations remain the most important activities for most CIOs. In the other responses, one person mentioned mentoring others, another doing consulting outside the institution in order to gain insights and different perspectives, and one person mentioned "hiring knowledgeable staff and listening to them."

Change in IT leadership continues to hit many institutions as 47 percent of CIOs have been in their role less than 10 years, and 23 percent have been in their current role 5 years or less. On the other hand, 31 percent of CIOs have been in their current role for 15 years or more. In the coming years, we should continue to see job opportunity in the CIO position as the number of retirements continues to occur.

What Activities are Important for a CIO for Professional Development

Interactions with vendors and/or business partners
73%

Visits to other institutions/organizations
78%
77%

Peer relationships
92%
93%

Personal research
76%
75%

Webinars
41%
43%

Professional associations
86%
87%

Other (please specify)
8%
4%

■ 2016 ■ 2017

Total Years in Current Position

Greater than 15 years
25%
29%
29%
31%
31%

Greater than 10 but less than 15 years
25%
23%
24%
18%
22%

Greater than 5 but less than 10 years
28%
25%
24%
28%
24%

Less than 5 years
22%
24%
23%
24%
23%

■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017
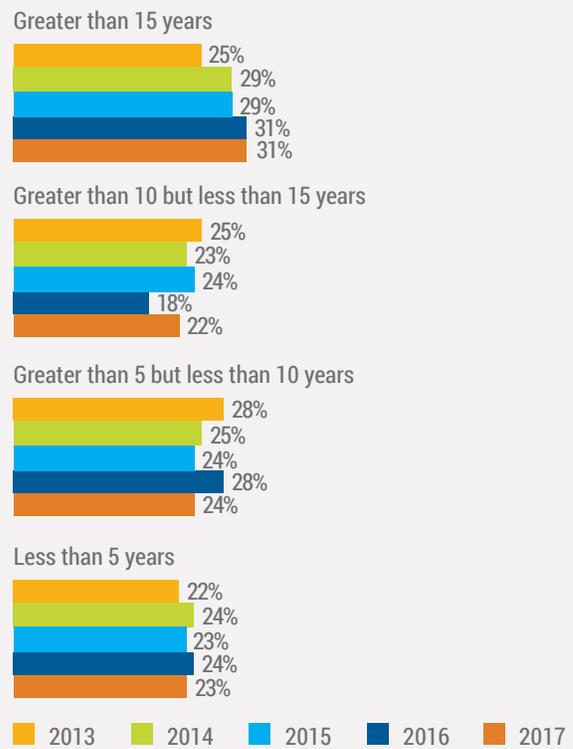
Higher-Education CIO Succession Planning

CIOs believe succession planning is important, and 86 percent of CIOs have an interest in developing a CIO succession plan. While administrators believe this is important (51 percent rate it high or moderate priority for senior executives), even more CIOs (86 percent) rate it as a high or moderate priority, while only 11 percent consider it a low priority. Seventy-four percent of CIOs have already identified one or more individuals in their organization they would or are mentoring as part of their succession plan.

Interest in Developing a CIO Succession Plan

High interest

- 38% (2013)
- 35% (2014)
- 37% (2015)
- 41% (2016)
- 40% (2017)

Moderate interest

- 48% (2013)
- 50% (2014)
- 49% (2015)
- 48% (2016)
- 46% (2017)

Low interest

- 13% (2013)
- 14% (2014)
- 12% (2015)
- 10% (2016)
- 11% (2017)

2013   2014   2015   2016   2017

and a shared leadership/decision-making model came in at 77 percent. Shared scholarly activities (papers, presentations, conferences) were the least crucial at 20 percent.

As in the last three years, even with CIO efforts to train and prepare the institution's next CIO, 34 percent responded that their institutions would recruit externally whether or not a succession plan was in place, and only 16 percent sensed their institutions would promote from within. Fifty-one percent believe that if their institution were to look outside for a replacement, it would be to get new ideas and thinking.

Opinions on How the CIO Would be Replaced

Promote from within, knowing that a succession plan is in place

- 10% (2013)
- 12% (2014)
- 11% (2015)
- 10% (2016)
- 11% (2017)
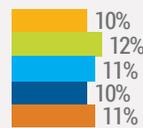
Promote from within, with no succession plan in place

- 4% (2013)
- 3% (2014)
- 5% (2015)
- 2% (2016)
- 5% (2017)

Recruit from the ouside, whether or not a succession plan was in place

- 40% (2013)
- 42% (2014)
- 39% (2015)
- 39% (2016)
- 34% (2017)
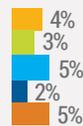
It could go either way, depending on circumstances and/or executive leadership at the time

- 46% (2013)
- 43% (2014)
- 45% (2015)
- 49% (2016)
- 50% (2017)

2013   2014   2015   2016   2017

Building strong alliances and succession planning are important to CIOs and the institutions they represent, and a mentoring system can help CIOs navigate political and technical hurdles they experience as they advance professionally. Those who had selected one or more individuals to mentor based their decision on the mentee's skill sets in key areas. Eighty-eight percent of the CIOs prioritized management and leadership acumen as the reason they chose this person. Other important traits included interpersonal abilities, collaboration and political skills, and intelligence and ability to learn. Technical skills were important for only 45 percent of those responding. Over 65 percent of CIOs had identified at least one person they would like to mentor to replace them as CIO. Essential building blocks of the mentoring process included high levels of collaboration and knowledge transfer as needed (90 percent), followed by the opportunities to lead key projects, processes with guidance (88 percent). Exposure of the mentee to senior administrative discussion was important to 81 percent of the CIOs,

FINANCIAL AND BUDGET PLANNING

While budgets seem to be getting better for both the institution and IT since 2010, we still saw a significant number of institutions with decreasing budgets (25 percent). Most respondents stated that total institutional operating budgets have "grown from the prior year budget" (44 percent). This was a moderate increase from last year's 40 percent. Also, the percent of institutions reporting decreased institutional operating budgets dropped to 25 percent this year, from 31 percent last year, and 31 percent reported that their budget stayed the same (up 2 percent from 2016). Generally, the changes from 2016 to 2017 indicate that many institutions are rebounding slightly from the dilemma of dealing with either flat or decreased funding at the institutional level. This is good news, but considering tight budgets at both the institutional and IT level, it doesn't appear to be occurring at a level that will provide recovery from significant declines in the last ten years for many institutions.

When asked about next year's institutional budget, 37 percent of CIOs anticipated growth, 37 percent expected budgets to stay the same, and 27 percent projected a smaller operating budget for their institution. The percent of anticipated increases in institutional budgets (37 percent) is the lowest in the most recent five years (43 percent in 2016, 46 percent in 2015, 47 percent in 2014 and 46 percent in 2013). The percent of anticipated decreases in institutional budgets (27 percent) is the highest in the most recent five years (25 percent in 2016, 21 percent in 2015, 22 percent in 2014, and 18 percent in 2013). These two metrics indicate that, overall, average institutional funding is anticipated to move downward, or at best, stay the same.

Budgets for Information Technology

Thirty-four percent of CIOs saw their IT budget for fiscal year 2016-2017 increasing from last year, rather than staying the same (41 percent) or decreasing (24 percent). Twenty-nine percent expect their IT budget to increase while 42 percent expect it to stay the same and 28 percent expect it to decrease. This seems to imply that some of those expecting increases in the general budget may not see a corresponding increase in IT.

Fiscal Year Changes in Institutional Budgets

Decreased from prior year budget

- 21%
- 26%
- 24%
- 31%
- 25%

Increased from prior year budget

- 47%
- 43%
- 48%
- 40%
- 44%

Stayed the same as prior year budget

- 33%
- 31%
- 28%
- 29%
- 31%

■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017

Changes in Fiscal Year Budget for IT:

Decreased from prior year budget
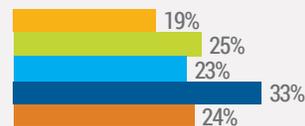
- 19%
- 25%
- 23%
- 33%
- 24%

Increased from prior year budget

- 44%
- 38%
- 42%
- 38%
- 34%

Stayed the same as prior year budget

- 36%
- 38%
- 34%
- 29%
- 41%

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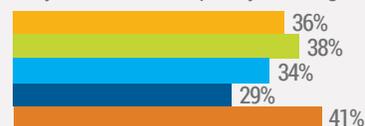
One key indicator on the true value of IT strategic plans is the IT budget plan. If it is linked to the budget-planning process, that indicates IT planning is more than a planning exercise. If it isn't linked or incorporated into the budget-planning process, then all bets are off on its real value.

Percentage of IT Strategic Plans That are Linked or Incorporated Into the Budget-Planning Process

No

27%	
30%	
25%	
33%	
29%	

Yes

73%	
70%	
75%	
67%	
71%	

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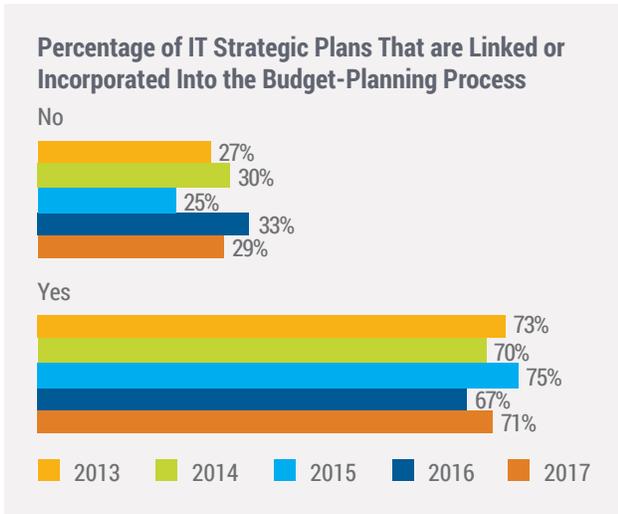
Where IT Cuts Happened

Those CIOs reporting reductions in IT funding scrambled to identify sources of savings. Among the targeted reductions, the most reported items were reductions in new IT investments (52 percent) and delayed maintenance or replacements (53 percent). There was a tendency among those with reductions to avoid reduced staff development as a target: this dropped to 28 percent from last year's 39 percent of institutions reporting. This is likely due to the staff development required to transform IT systems to more economical solutions.

If IT Budget Has Been Cut From The Prior Year, Targeted Savings Areas Include

New IT investments (hardware/software/services)
- 52%
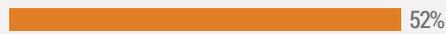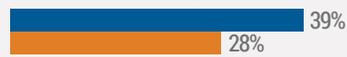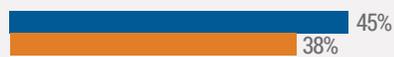
Personnel
- 36%
- 35%
- 31%
- 28%
- 42%

Consulting services
- 27%

Nothing has changed
- 37%
- 32%
- 38%
- 28%
- 15%

Professional development
- 39%
- 28%

Travel
- 45%
- 38%

Services
- 26%
- 23%
- 20%
- 20%
- 26%

Delayed maintenance or replacements
- 36%
- 45%
- 39%
- 44%
- 53%
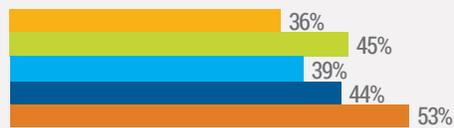
Software licenses
- 20%
- 17%
- 16%
- 23%
- 19%

New initiatives
- 34%
- 41%
- 43%
- 39%
- 47%
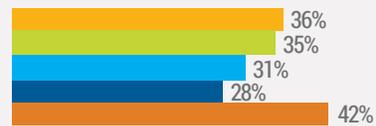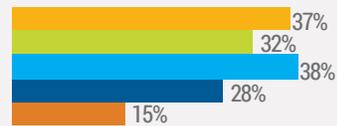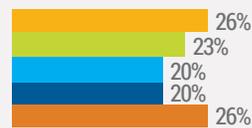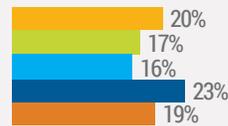
Other
- 8%
- 5%
- 7%
- 6%
- 7%
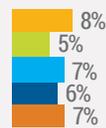
■ 2013   ■ 2014   ■ 2015   ■ 2016   ■ 2017

Stretching IT Funding

With only 37 percent of CIOs anticipating an increase in their IT budgets next fiscal year and with an increased demand for services, stretching available funding continues to be a challenge. The top response from CIOs regarding how they met the funding challenge for fiscal year 2016-2017 was through increased efficiencies and more centralization of support and services (71 percent), followed by renegotiation of vendor contracts (64 percent), moving to cloud computing solutions

(57 percent), using shared services solutions (50 percent), greater use of student workers (33 percent), greater use of open source (30 percent), and cutting services (30 percent). These strategies received increased focus compared with the 2016 survey. Completing the list were the less innovative, but sensible, strategies of spending less by reducing staff development (29 percent), new revenue streams (23 percent), and not filling staff positions (23 percent). Six percent of CIOs reported that they have no new strategies to stretch IT funding, which is up from 3 percent last year.

Strategies Being Considered for Stretching IT Funding

Greater use of student workers
33%

Cutting staff or non-replacement of staff
23%

Cutting professional development and travel
29%
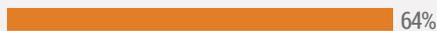
Renegotiating contracts
64%

Increased efficiencies and more centralization of support and services
82%
74%
78%
81%
71%

Cloud computing
65%
70%
68%
69%
57%

Other new revenue streams including increased fees, selling services
23%
23%
18%
22%
23%

Cutting services
21%
24%
21%
23%
30%
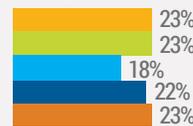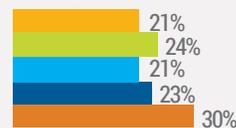
Greater use of open source
33%
26%
25%
26%
30%
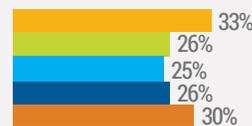
Shared services/collaboration with other institutions
58%
54%
51%
54%
50%

No new strategies
3%
5%
6%
3%
6%

■ 2013   ■ 2014   ■ 2015   ■ 2016   ■ 2017

13
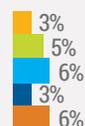
For those who had to cut their IT budget this fiscal year, the most frequently selected cuts were in renegotiating contracts (65 percent, down from 68 percent last year), cutbacks in services and support (49 percent, down from 53 percent last year), non-replacement of staff (42 percent, up from 39 percent), and increased use of part-time staff (32 percent, not collected last year).

For CIOs planning for no growth or cuts to their IT budgets next fiscal year, renegotiating contracts (65 percent, down from 68 percent), cutbacks in services and support (49 percent, down from 53 percent), non-replacement of staff (42 percent, up from 39 percent), staff position eliminations (23 percent, up from 21 percent) and increased use of chargebacks (14 percent, down from 19 percent) were the top choices. This indicates lower staffing for IT to cope with tight budgets.

Likely Strategies for No-Growth or Cuts in IT Budget for the Next Fiscal Year

Increased use of part-time employees and/or job sharing

32%

Staff position eliminations

23%
21%
15%
21%
23%

Cutbacks in services and support

44%
51%
44%
53%
49%
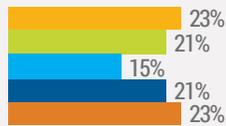
Increased student fees

8%
7%
11%
11%
15%
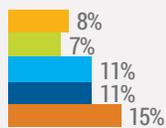
Increased use of chargebacks for services/support

16%
17%
17%
19%
14%
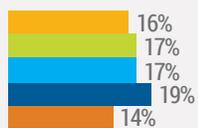
Renegotiating contracts with vendors

53%
53%
65%
68%
65%

Non-replacement of staff leaving the institution

40%
42%
46%
39%
42%

Other

23%
21%
17%
17%
18%
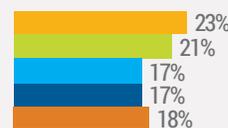
■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017

Technology Fees

The practice of charging fees to help cover direct IT expenses increased substantially this year. In 2017, 54 percent of institutions charged a single, omnibus technology fee, up 7 percent from 2016 (47 percent). Those institutions charging a tech fee either charge a single fee (54 percent) or tie it to specific courses or programs (4 percent), while 42 percent do not charge a fee.

Use of Student Technology Fees

Single tech fee per semester

- 46%
- 51%
- 46%
- 47%
- 54%

Tech fees tied to specific courses

- 4%
- 3%
- 5%
- 5%
- 4%

No student tech fee

- 50%
- 45%
- 49%
- 48%
- 42%

■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017
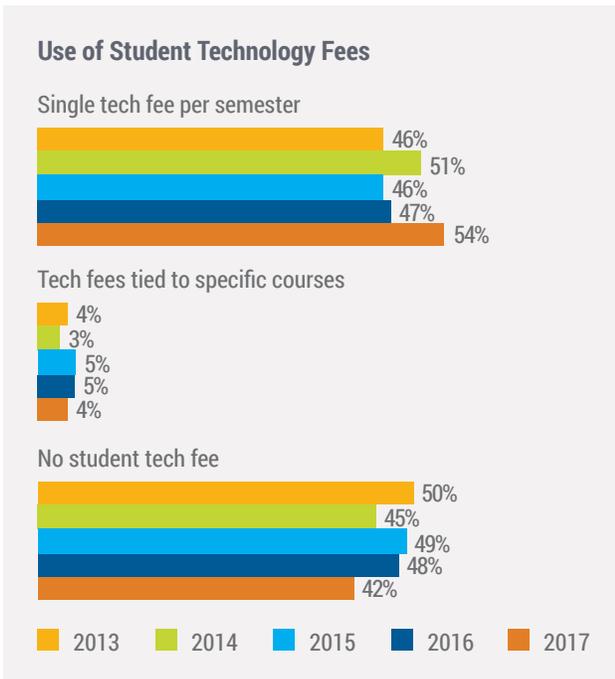
The money collected from student technology fees doesn't necessarily make its way into the IT budget. Only 36 percent of institutions reported that student fees went into the IT budget, up 4 percent from 32 percent in 2016. Many CIOs have to face the political issues surrounding tech fees when these funds end up in the general fund (38 percent), a slight decrease from 40 percent in 2016 and 2015.

Use of Tech Fees, If Charged Fiscal Year 2016-2017

Tech fees split between IT and general fund

- 19%
- 21%
- 23%
- 22%
- 25%
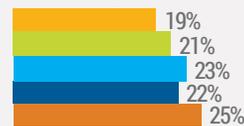
Tech fees go into general fund

- 39%
- 39%
- 40%
- 40%
- 38%

Tech fees split between course or department budget

- 6%
- 5%
- 5%
- 10%
- 8%
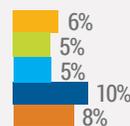
Tech fees go directly into IT budget
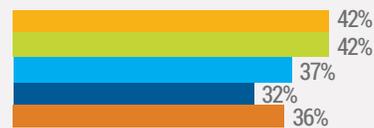
- 42%
- 42%
- 37%
- 32%
- 36%

■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017

For other institutions, tech fees were split between the general fund and the IT budget (25 percent) or went into a specific course or department budget (8 percent). This allocation to departments outside IT dropped to 8 percent from the 10 percent reported last year.

IT ORGANIZATION AND GOVERNANCE

Since 2011, the central IT organization reporting areas have been very consistent. The largest changes over time include reductions in reporting of both library management and research computing, while institutional research continues to increase in reporting to IT. The 2017 survey added additional responsibility questions including IT security and IT disaster recovery with 99 percent and project management reporting at 82 percent. The good news is that IT staffing is expected to remain the same (64 percent) over the next year while only 15 percent are expecting an IT staffing reduction. Thirteen percent of the respondents reported not outsourcing any IT services. This is an 8 percent increase over last year. The largest percentage of services being outsourced is Software as a Service (69 percent) followed by email/social networking (63 percent). Since 2011, CIOs have consistently reported IT governance as very important (62 percent). CIOs report their IT governance model as somewhat (49 percent) or very effective (16 percent).

Staffing

In 2017, there was an overall 4 percent uptick reported in increased IT staff size, while 21 percent of institutions reported a decreased IT staff size (down 3 percent from last year). There appears to be no trend, however, as the overall projection for 2018 indicates IT staff size will remain largely the same—64 percent of CIOs expect a static staff size in 2018, as compared with a forecast last year of 58 percent.

Interestingly, the 30 percent figure representing institutions that experienced an increase in full-time IT staffing is the highest since 2013.

Another significant observation is that the increase in the percentage of institutions expecting static staffing levels is fairly large (from 58 percent to 64 percent). Equally large is the decrease in the number of institutions expecting to increase staff in the coming year.

Changes to the Size of Full-Time IT Staff
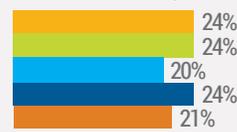
Stayed the same

- 2013: 42%
- 2014: 48%
- 2015: 54%
- 2016: 51%
- 2017: 49%

Decreased in the past 12 months

- 2013: 24%
- 2014: 24%
- 2015: 20%
- 2016: 24%
- 2017: 21%

Increased in the past 12 months

- 2013: 34%
- 2014: 28%
- 2015: 27%
- 2016: 26%
- 2017: 30%

Legend: 2013 | 2014 | 2015 | 2016 | 2017

Projections for Size of Full-Time IT Staff

Stayed the same

- 2013: 52%
- 2014: 58%
- 2015: 59%
- 2016: 58%
- 2017: 64%

Decrease in the next year

- 2013: 16%
- 2014: 14%
- 2015: 10%
- 2016: 13%
- 2017: 15%

Increase in the next year

- 2013: 32%
- 2014: 28%
- 2015: 31%
- 2016: 29%
- 2017: 22%

Legend: 2013 | 2014 | 2015 | 2016 | 2017
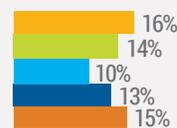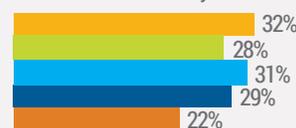
Smaller institutions expect no growth in IT staff while larger institutions are more optimistic about staffing size growth.

Projections for Size of Full-Time IT Staff, by Size of Institution

Stayed the same

- 44%
- 57%
- 67%
- 69%
- 86%

Decrease in the next year

- 28%
- 13%
- 3%
- 15%
- 14%

Increase in the next year

- 28%
- 30%
- 30%
- 15%
- 0%

- 🟧 More than 25,000 students
- 🟩 More than 10,000 students but less than 25,000 students
- 🟦 5,001 - 10,000 students
- 🟦 3,001 - 5,000 students
- 🟧 3,000 students or less
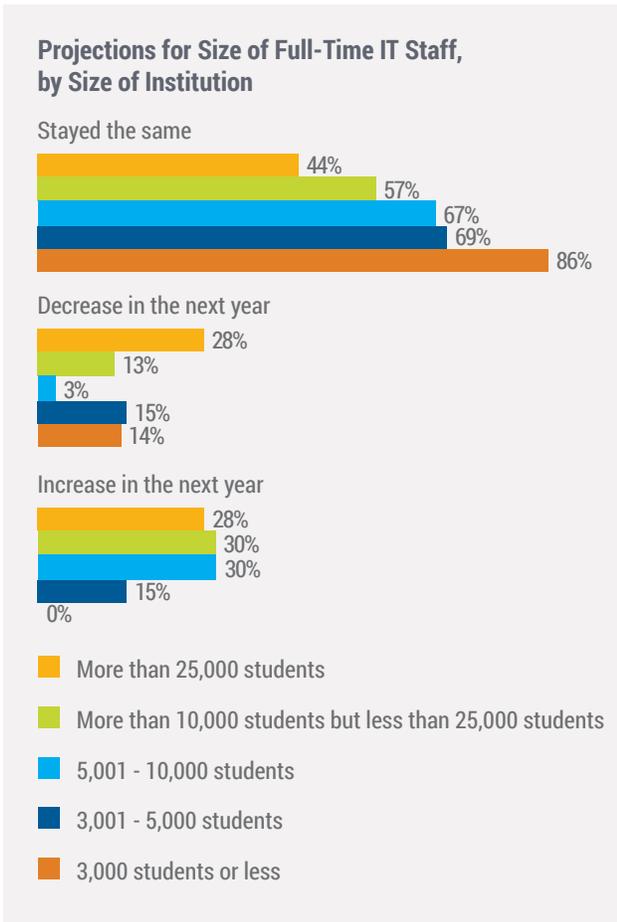
The type of institution seems to have an impact, with research universities, doctoral-granting institutions, and four-year master's degree programs more likely to draw upon graduate students who can take on activities that students at two-year and four-year institutions could not do.

Changes to Percent of Work Effort Performed by Student Workers

More than 20%

- 12%
- 15%
- 13%
- 12%
- 8%

Between 10 and 20%

- 31%
- 31%
- 30%
- 36%
- 32%

10% or less

- 57%
- 54%
- 58%
- 51%
- 59%

- 🟧 2013 🟩 2014 🟦 2015 🟦 2016 🟧 2017

17
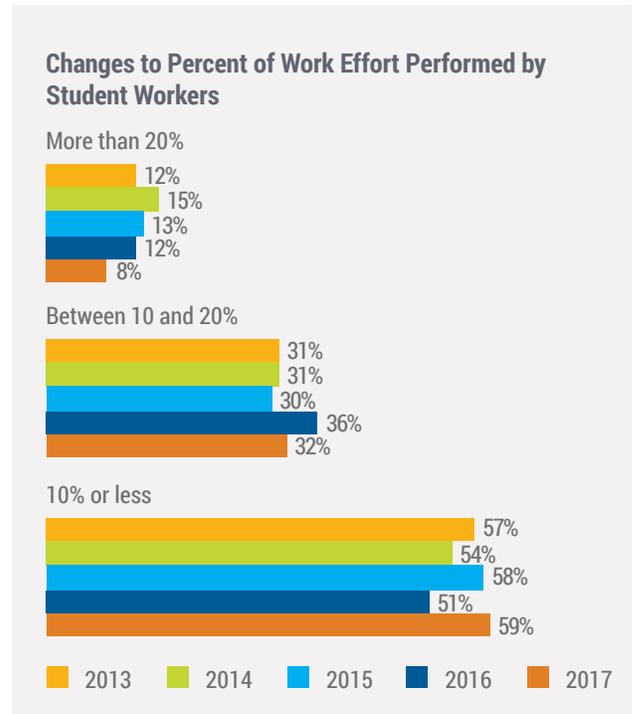
Percent of Work Effort Performed by Student Workers, by Institution Type

More than 20%
- 7%
- 6%
- 16%
- 0%
- 3%

Between 10 and 20%
- 43%
- 23%
- 39%
- 13%
- 24%

10% or less
- 50%
- 71%
- 46%
- 87%
- 72%

- ■ Research university
- ■ Doctoral-granting institution
- ■ Four-year with master's degree programs
- ■ Four-year institution only
- ■ Two-year institution
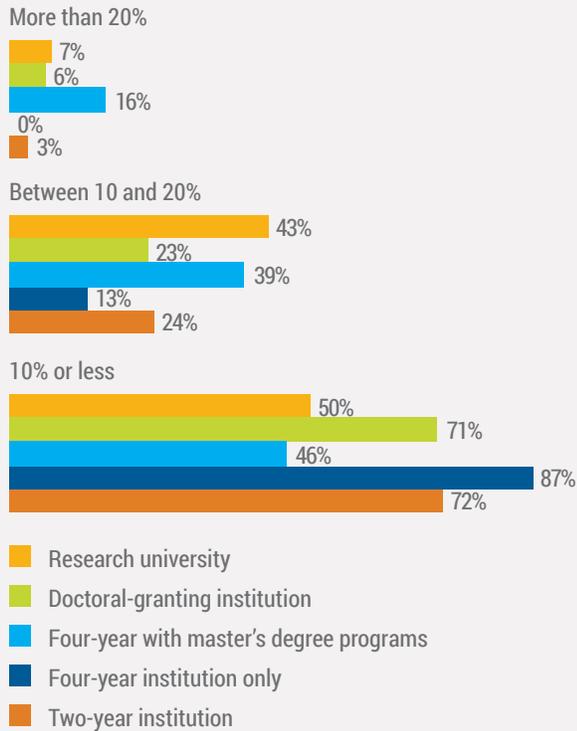
Outsourcing

For the third consecutive year, we are seeing considerable year-over-year variance in outsourcing. CIOs who reported that their institutions do not engage in outsourcing activity are at an all-time high (13 percent) for 2017. Also, the percentage of institutions reporting increased outsourcing in the past two years is at a survey low of 42 percent, and down significantly from the 54 percent figure of 2016.

Use of Outsourcing of IT Servicing or Support

Don't use outsourcing for anything
- 4%
- 5%
- 9%
- 5%
- 13%

Stayed the same
- 40%
- 35%
- 45%
- 34%
- 40%

Decreased in the past 2 years
- 2%
- 2%
- 2%
- 7%
- 5%

Increased in the past 2 years
- 53%
- 58%
- 44%
- 54%
- 42%

- ■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017
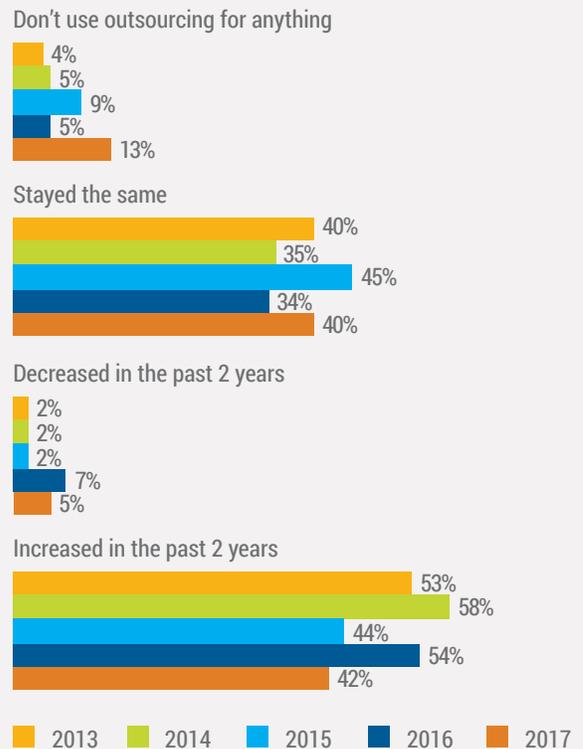
As CIOs considered future use of cloud computing and outsourcing, the "…as a Service" references indicate that software is by far the most likely to be consumed as Software as a Service, (SaaS), followed by Infrastructure as a Service, (IaaS), then Platform as a Service (PaaS). The consistent functional category leader, email, remains the leader at 63 percent. Consideration for moving administrative applications (ERP) to the cloud remains high on the list, but a bit down from last year at 58 percent.

Projections on Future Use of Cloud Computing and Outsourcing

Project management
12%

Research management and applications
13%

Data management and applications
27%

Software as a Service (SaaS)
69%

Infrastructure as a Service (IaaS)
44%

Platform as a Service (PaaS)
35%
35%

Data center and/or storage
60%
59%
58%
61%
54%

Security
6%
10%
15%
14%
18%
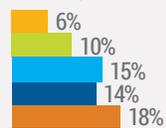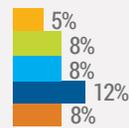
Networking
5%
8%
8%
12%
8%

Email/social networking/communications
68%
66%
67%
62%
63%

Web development/applications
29%
33%
42%
45%
37%
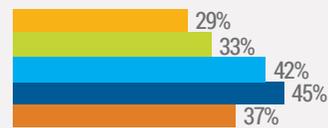
Academic applications (including course management systems/learning management systems)
39%
48%
57%
58%
55%
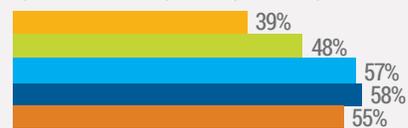
Administrative applications (ERP)
31%
45%
47%
60%
58%
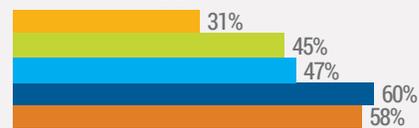
■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017

IT Governance

Most CIOs continue to view IT governance as very important (62 percent), with no or negligible change year over year in perspectives on this topic.

Importance of IT Governance

Not used

- 2% (2013)
- 2% (2014)
- 2% (2015)
- 1% (2016)
- 1% (2017)

Of minimal importance

- 4% (2013)
- 5% (2014)
- 4% (2015)
- 3% (2016)
- 5% (2017)

Somewhat important

- 26% (2013)
- 24% (2014)
- 32% (2015)
- 32% (2016)
- 32% (2017)

Very important

- 68% (2013)
- 69% (2014)
- 62% (2015)
- 65% (2016)
- 62% (2017)

2013   2014   2015   2016   2017
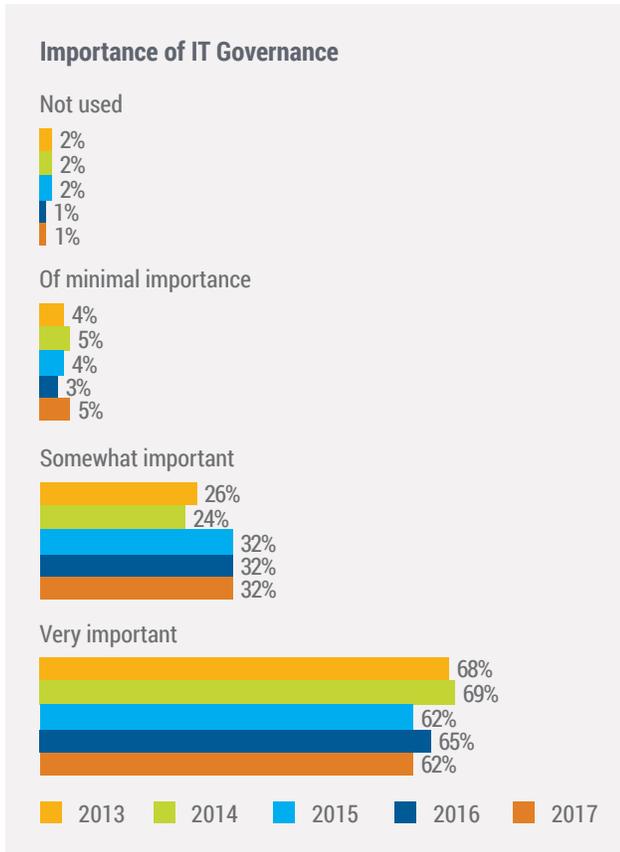
Consistent with reporting in previous years, most CIOs use IT governance as an advisory function, reserving the final decision for themselves. Only 10 percent of respondents rely completely upon the IT governance model to make decisions. An interesting change from last year is that 63 percent of CIOs indicate high reliance upon IT governance, but reserve the ultimate decision as being "mine," up from 55 percent.

Amount of Reliance Upon IT Governance to Aid in Decision-Making

Do not rely at all upon IT governance

- 2% (2013)
- 3% (2014)
- 3% (2015)
- 4% (2016)
- 4% (2017)

Low reliance upon IT governance model to make decisions

- 30% (2013)
- 27% (2014)
- 34% (2015)
- 29% (2016)
- 24% (2017)

Relatively high reliance but ultimate decision is "mine"

- 59% (2013)
- 58% (2014)
- 52% (2015)
- 55% (2016)
- 63% (2017)

Rely completely upon the IT governance model to make decisions

- 9% (2013)
- 12% (2014)
- 12% (2015)
- 12% (2016)
- 10% (2017)

2013   2014   2015   2016   2017

High level committee(s) is present in the vast majority of IT governance models in higher education, but there was a significant drop in board-level involvement, from 26 percent to 17 percent, which is the lowest in four years. Faculty groups, including Faculty Senate, were introduced this year as an option, and not surprisingly, more than half of all CIOs reported involvement with that important constituent group.

Composition of IT Governance

Faculty groups including Faculty Senate
- 56%

Board of Trustees/Directors/Governors/Others
- 14%
- 24%
- 21%
- 26%
- 17%

Outside influencers (advisory board)
- 16%
- 16%
- 17%
- 18%
- 20%

High level committee(s) to set priorities for IT
- 78%
- 79%
- 79%
- 78%
- 78%

User group(s)
- 68%
- 59%
- 64%
- 65%
- 64%

Other (please specify)
- 10%
- 6%
- 8%
- 10%
- 8%

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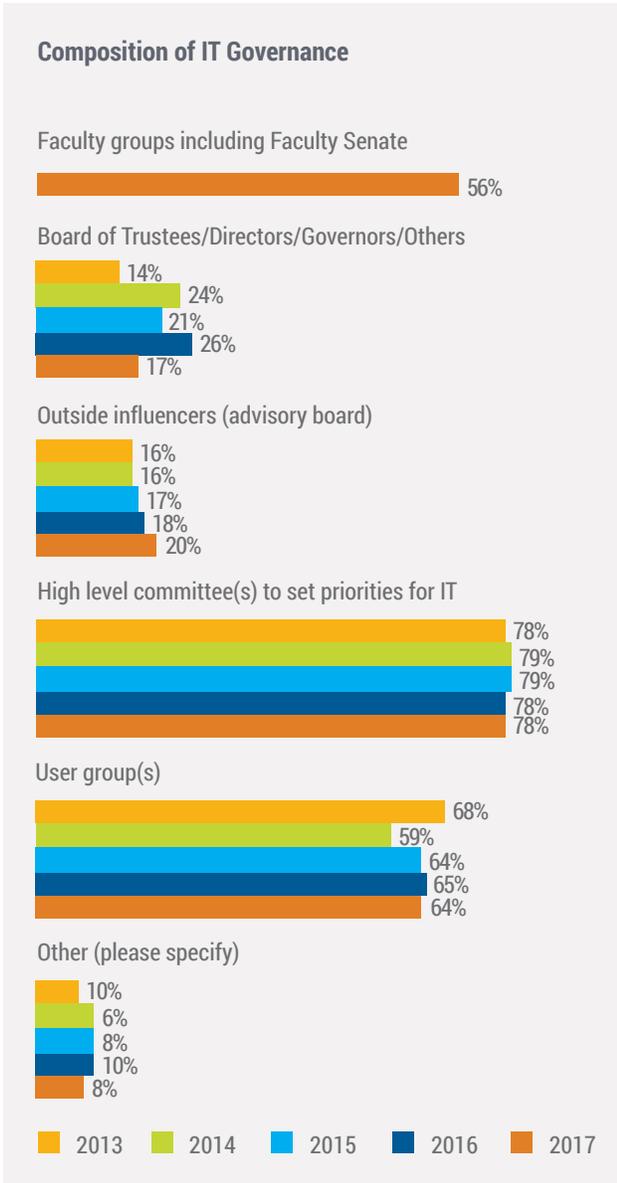
CONSUMERIZATION OF IT

CIOs' view of consumerization has changed over time. Since 2012, CIOs have increasingly lowered their expectations of benefits in the areas of financial savings, competitive campus positioning, and less need for community labs. Freedom of Choice is considered one of the greatest benefits of consumerization. Potential problems steadily include greater security concerns (91 percent), more staff needed to support (56 percent), issues with integration of existing systems (76 percent), less control (59 percent), and increased cost (29 percent). The major change from last year's survey was a 14 percent drop over the need for more bandwidth (50 percent compared with 64 percent in 2016.) Thirty-two percent of CIOs report consumerization is not having any impact on IT staff training and support. There was a 9 percent drop to 54 percent compared with 63 percent, of staff needing more training and development due to consumerization.

Potential Benefits of the Consumerization Movement

Exploration of new technologies

72%
65%

Less need for community labs

40%
41%
39%
38%
26%
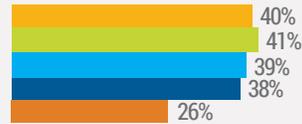
More competitive positioning for your institution

50%
50%
44%
32%
33%
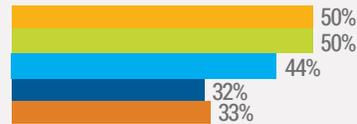
Less IT staff needed

8%
9%
11%
10%
13%

Freedom of choice

80%
80%
77%
69%
73%

Financial Savings

36%
34%
31%
38%
32%

None

5%
6%
7%
6%
8%

■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017

22
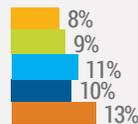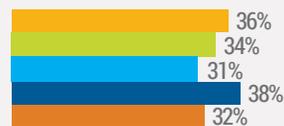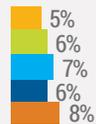
Potential Problems From the Consumerization Movement

Greater need for community labs

- 3%
- 3%
- 3%
- 3%
- 6%

Greater security issues/problems

- 92%
- 91%
- 92%
- 90%
- 91%

Greater cost

- 17%
- 28%
- 19%
- 21%
- 29%

More bandwidth needed

- 71%
- 70%
- 76%
- 64%
- 50%

Less control

- 43%
- 49%
- 41%
- 52%
- 59%

More staff needed for support

- 45%
- 44%
- 42%
- 48%
- 56%
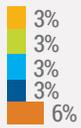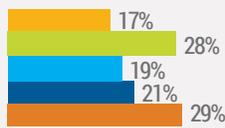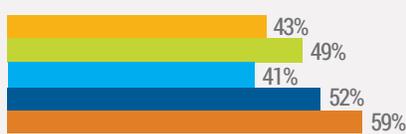
Integration with existing systems

- 69%
- 71%
- 72%
- 72%
- 76%

None

- 1%
- 1%
- 1%
- 1%
- 1%

Data integrity and consistency

- 52%
- 54%
- 41%
- 55%
- 62%

■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017
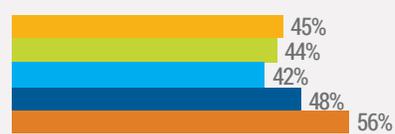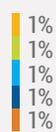
ADMINISTRATIVE COMPUTING

The survey results for 2017 continue to show a significant investment in vendor-based Enterprise Resource Planning (ERP) systems for core student, financial, payroll, human resources, advancement, and grants management services within higher education. Upgrades of these systems increased significantly this past year, most likely due to vendor-provided release schedules that offer new functionality, new features, and provide critical support for security patches and vulnerabilities.

Business-process engineering continued to grow in importance from last year, with heavy involvement by IT. Interestingly, the results for this year also point out an upward trend in both best-of-breed ERP solutions and business process re-engineering. Our assumption is that best-of-breed is desired because it provides far better capabilities and functionality for specific areas paralleling the initiative to improve efficiencies and processes.

While there is much ongoing discussion within higher education in moving administrative computing systems into either a hosted Infrastructure as a Service, (IaaS), Platform as a Service, (PaaS), or even to a Software as a Service (SaaS) model, many ERP and core administrative systems remain on premise, as reflected in this year's survey results. For higher education, the move to the cloud for ERP systems has been slower than some anticipated based on past survey results. Most cloud offerings from vendors of administrative applications are improving as technology advances and experience in the cloud with academic and social networking activities continue to grow.

However, security concerns persist in having administrative data hosted away from campus. Some of these concerns include the risk of data loss, breaches as well as cost and integration of data to other systems and services. These concerns will most likely lessen as more institutions are successful in moving to cloud ERP solutions over the coming years.

Enterprise Resource Planning (ERP)

Vendor-supplied ERP systems are still the major players on campus (79 percent), but have lost some ground down 5 percent from 2016 survey results. A continuing, slow decline in overall ERP systems make up the core administrative systems in higher education, down 7 percent from 2014. Best-of-breed solutions increased to 11 percent in 2017, a 4 percent increase from 2016. Overall that means that vendor applications dominate but institutions are more likely to pick and choose (best of breed) than in previous years.

Again this year, ERP systems are primarily supported and maintained on premise. While there was a small increase in outsourced ERP solutions last year, we did not see any significant response (0 percent) in outsourced solutions for 2017 and only 1 percent use open-source solutions. Although cloud solutions for administrative applications continue to be heavily discussed in higher education, few institutions have moved or are in the process of moving these systems into the cloud as reflected in this year's survey. This may be due to overall cost of changing from current applications, to many institutions waiting to see how others are doing in their move to cloud-based administrative applications, and real numbers on the actual cost of moving to the cloud.

Core Administrative Applications (financials, student systems, human resources, advancement)

Best-of-breed

7%
9%
9%
7%
11%

Homegrown

6%
3%
3%
2%
4%

Outsourced

0%
1%
1%
2%
0%

Open-source

0%
0%
0%
1%
1%

ERP, vendor-supplied

83%
86%
85%
84%
79%

Other

1%
2%
4%
5%

■ 2013   ■ 2014   ■ 2015   ■ 2016   ■ 2017
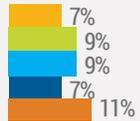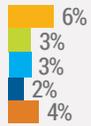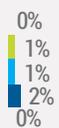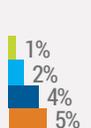
Component Breakdown

The majority (over 88 percent) of the ERP module components for higher education are in the business areas of financial, student services, financial aid, human resources, and advancement. Many of these business areas demand the currency of state and federal regulations and policy, thus they are best maintained by vendor providers who are able to interpret and implement state and federal requirements on a large scale.

The largest change over the years is in the area of grants management as more institutions are moving to a homegrown solution. Vendor-supplied grants management still maintains the largest percentage with 69 percent, but with homegrown modules increasing to 24 percent over last year's 16 percent, while 30 percent state they were in the process of upgrading their grants management module.

Types of Administrative Applications

Grants management
- Outsourced: 4%
- Homegrown: 24%
- Open-source: 3%
- Vendor-supplied: 69%

Advancement
- Outsourced: 5%
- Homegrown: 5%
- Open-source: 1%
- Vendor-supplied: 90%

Payroll
- Outsourced: 7%
- Homegrown: 5%
- Open-source: 0%
- Vendor-supplied: 88%

Human resources
- Outsourced: 4%
- Homegrown: 6%
- Open-source: 0%
- Vendor-supplied: 90%

Financial aid
- Outsourced: 1%
- Homegrown: 8%
- Open-source: 0%
- Vendor-supplied: 91%

Student registration, grading, transcripting
- Outsourced: 1%
- Homegrown: 8%
- Open-source: 0%
- Vendor-supplied: 91%

Financials (GL, AP, AR...)
- Outsourced: 2%
- Homegrown: 3%
- Open-source: 2%
- Vendor-supplied: 93%

Legend:
- Outsourced
- Homegrown
- Open-source
- Vendor-supplied

Upgrade Planning

There were significant increases in institutions that have begun upgrades of their core systems this past year, including: financial aid (30 percent), payroll (34 percent), financials (30 percent), human resources (34 percent), and student services (29 percent). This pattern aligns with the upgrade timings often matched with the vendor-supplied upgrade releases. The advantages of upgrading and keeping systems current offers customers new features and functionality, as well as provides important security patches and critical maintenance from the vendors. More than 29 percent of responders stated they were in the process of upgrading all ERP modules with the exception of only 19 percent currently in the process of upgrading the advancement module. In the next two to three years, 36 percent plan on upgrading the advancement module.

While many institutions continue to face tight budgets, in-progress and anticipated upgrades have accelerated this past year over 2016. There may be advantages to cloud solutions in the future as some products and solutions may no longer be offered as an on-premise solution. Thus, cloud solutions may be the only offered option when a product upgrade is considered.

Projections for Replacing or Making a Major Upgrade

Grants management
- 23%
- 17%
- 30%
- 30%
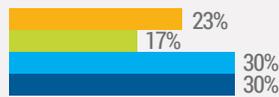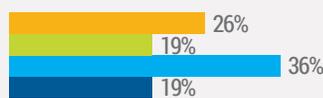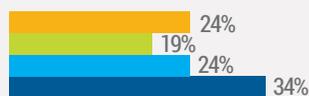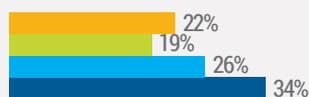
Advancement
- 26%
- 19%
- 36%
- 19%

Payroll
- 24%
- 19%
- 24%
- 34%

Human resources
- 22%
- 19%
- 26%
- 34%

Financial aid
- 25%
- 18%
- 27%
- 30%
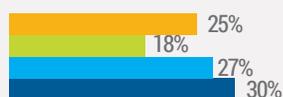
Student registration, grading, transcripting
- 25%
- 18%
- 28%
- 29%
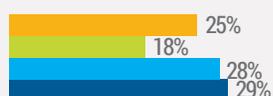
Financials (GL, AP, AR...)
- 21%
- 24%
- 24%
- 30%

- 🟧 More than six years
- 🟩 Four to six years
- 🟦 Next two to three years
- 🟦 In process

Business Process Improvement

Business process re-engineering (BPR) continues in importance with 53 percent stating it is very important and 42 percent stating it is somewhat important to their campus. Just two years ago, only 43 percent considered BPR as very important. IT is either heavily involved in BPR at their institution (60 percent) or peripherally involved (37 percent).

Changes to the Importance of Business Process Re-engineering

Very important
- 43%
- 48%
- 53%

Somewhat important
- 48%
- 45%
- 42%

Not important
- 8%
- 6%
- 6%
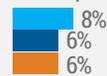
🟦 2015   🟦 2016   🟧 2017

IT's Involvement in Business Process Re-engineering

Heavily involved
- 60%

Peripherally
- 37%

Not involved
- 3%

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Customer Relationship Management

This year the LBCIO board added questions concerning Customer Relationship Management solutions (CRM). We wanted to know if CRM is commonly used and how it is supported. The results indicate that most institutions have one or more CRM solutions but it is as likely to be supported by IT (38 percent) as a department (37 percent) or integrated into other administrative applications (36 percent).

The most common areas for use of CRM are in admissions/recruitment (89 percent) followed by advancement (fund-raising) activities. We will follow these questions in the future but expect the use of CRM to grow in other areas.

Use and Support of CRM Systems

We are considering a CRM solution
13%

CRM is integrated with other administrative applications
36%

CRM is supported by central IT
38%

CRM is mostly a departmental solution
37%

Institution has one or more CRM solutions
55%

How CRM is Used

Admissions/recruitment
89%

Advancement (fund-raising) activities
60%

Student support services
38%

Registration
17%

Other (please specify)
9%

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ACADEMIC COMPUTING

Technology is fundamental to teaching and learning and IT organizations are increasingly challenged by the changes and advances in academic resources. With so many initiatives like BYOD (Bring Your Own Device), online learning, and remote noncampus-based student populations, CIOs have been predicting a major reduction in computer labs or community labs, but this has not transpired. As financial pressures continue to mount for most institutions, many seek ways to cut costs while improving revenue from increases in enrollments and retention, and many are looking to data analytics and business intelligence for accurate and meaningful data to make informed decisions. This year's survey confirmed a number of trends, as well as provided a few surprises regarding teaching and learning, including the following:

- Instability in vendor dominance in the CMS/LMS market continues, but 70 percent of the institutions reported a vendor-supplied option.

- A big surprise was the further reduction in the CMS/LMS being outsourced, down from 12 percent last year to 9 percent this year. Before 2016, outsourcing of the CMS/LMS maintained an upward trend since the 2012 survey.

- Institutions selecting open-source products decreased this year by 3 percent from last year. The selection of open-source products has fluctuated over the last six years with no real trend.

- The use of Blackboard as a standard has increased by 2 percent in 2017 from last year after a declining trend in past years since the 2013 survey.

- The results show that Desire2Learn is used more by two-year institutions, while four-year institutions preferred Moodle.

- The use of Canvas continued its upward trend as a standard, increasing by 2 percent from last year.

- Over the last six years, there has been little change in the length of time institutions have been using their current CMS/LMS solutions, with 67 percent using the same system for more than five years. Thirty-one percent of the institutions are considering replacing their current systems over the next three years or more.

- Central IT continues to provide the primary support for the CMS/LMS with 53 percent, but that number is down by 2 percent from last year and down from 63 percent in 2012.

- The Office of the Provost/Chief Academic Officer continues to increase as the primary reporting authority for instructional design, course design, and online learning management (40 percent), and separate units for online education have increased to 14 percent this year. Reporting to the Office of the CIO has decreased to 22 percent after having remained steady at 28 percent for the last two years.

- Predictions that community labs would decrease seem to fluctuate every year with a decrease from 21 percent last year to 13 percent this year. Despite the increased pressure for space and a yearly maintenance cost upwards of $500 per device, support for community labs has remained consistent over the last six years.

- Institutions that maintained the same support and plans for community labs for the past five years increased to 43 percent, which is a 10 percent jump from last year. This may be attributed to the decision most institutions have made to continue providing hardware and software for students to use in community labs. Computer hardware and the required software may not be affordable for some students.

Types of Institutional Standard CMS Systems

The majority of institutions (70 percent) continue to use a vendor-supplied CMS/LMS as the standard. Surprisingly, the number of institutions using open-source solutions decreased from 23 percent in 2016 to 20 percent in 2017. The trend in institutions using an outsourced solution was reversed. Outsourced CMS/LMS declined further from 12 percent in 2016 to 9 percent in 2017. This decline could be an anomaly or due to increased vendor costs or poor outsource experiences.

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Changes to the Type of Course/Learning Management System Currently Being Used

Homegrown

- 2013: 3%
- 2014: 3%
- 2015: 2%
- 2016: 2%
- 2017: 0%

Outsourced

- 2013: 19%
- 2014: 16%
- 2015: 22%
- 2016: 12%
- 2017: 9%

Open-source

- 2013: 15%
- 2014: 24%
- 2015: 16%
- 2016: 23%
- 2017: 20%

Vendor supplied

- 2013: 60%
- 2014: 54%
- 2015: 59%
- 2016: 62%
- 2017: 70%

Other

- 2013: 3%
- 2014: 3%
- 2015: 2%
- 2016: 1%
- 2017: 1%
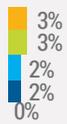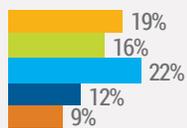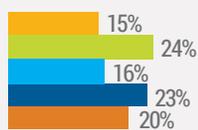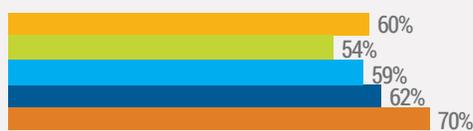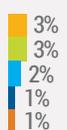
2013   2014   2015   2016   2017

Changes in the Use of Course/Learning Management Vendors

Blackboard

- 2013: 52%
- 2014: 48%
- 2015: 47%
- 2016: 40%
- 2017: 42%

Moodle

- 2013: 27%
- 2014: 34%
- 2015: 32%
- 2016: 28%
- 2017: 21%

Desire2Learn

- 2013: 13%
- 2014: 10%
- 2015: 9%
- 2016: 10%
- 2017: 12%

Sakai

- 2013: 5%
- 2014: 5%
- 2015: 7%
- 2016: 7%
- 2017: 4%

Canvas

- 2013: 4%
- 2014: 8%
- 2015: 13%
- 2016: 21%
- 2017: 23%

Other

- 2013: 5%
- 2014: 5%
- 2015: 8%
- 2016: 7%
- 2017: 5%
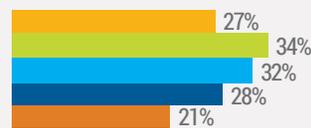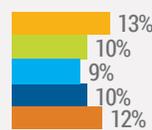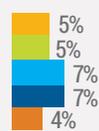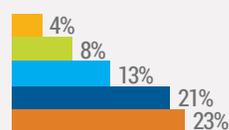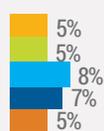
2013   2014   2015   2016   2017

Blackboard is the overall Course/Learning Management system institutional standard at 42 percent, which is an increase of 2 percent from last year. Canvas adoption grew by 2 percent, and was most popular at research universities. Desire2Learn was popular in two-year institutions, while Moodle was prominent in four-year institutions.

Longevity and Replacement of CMS Systems

There has been little change over the past five years regarding the longevity of the use of CMS/LMS at institutions, with 67 percent of the institutions reporting they have used the same CMS/LMS longer than five years (up from 64 percent in 2016). Thirty-one percent of the institutions reported that they anticipate replacing their CMS/LMS after three or more years. Interestingly, this is the same percentage as last year. Twenty percent of the respondents are currently considering replacing their CMS/LMS.

Longevity in the Use of Current Course Management System

Implementing new CMS
- 3%
- 2%
- 5%
- 4%
- 5%

Less than two years
- 9%
- 8%
- 8%
- 7%
- 8%

Two to five years
- 28%
- 27%
- 27%
- 24%
- 21%

More than five years
- 59%
- 63%
- 60%
- 64%
- 67%

Legend: 2013, 2014, 2015, 2016, 2017

Consideration to Replace Current Course Management System

2013
- 26%
- 14%
- 26%
- 35%

2014
- 27%
- 22%
- 20%
- 32%

2015
- 24%
- 21%
- 19%
- 37%

2016
- 26%
- 18%
- 25%
- 31%

2017
- 24%
- 20%
- 25%
- 31%

Legend:
- Don't know
- Currently considering
- Two to three years
- More than three years

Maintaining and Managing the CMS/LMS Infrastructure for Online Learning

The responsibility for maintaining the CMS/LMS still overwhelmingly resides in Central IT, at 53 percent, which is a decrease of 2 percent from last year and a decline from a high of 60 percent in 2013. It appears the declining trend in outsourcing the CMS this past year is in line with outsourced CMS support decreasing to 17 percent. Support from academic computing also increased to 11 percent in 2017 from 9 percent in 2016.

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Changes in Responsibility for Maintenance of CMS and Related Systems

Shared services
- 4% (2013)
- 2% (2014)
- 6% (2015)
- 3% (2016)
- 4% (2017)
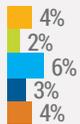
Central IT
- 60% (2013)
- 60% (2014)
- 56% (2015)
- 55% (2016)
- 53% (2017)

Outsourced
- 17% (2013)
- 18% (2014)
- 19% (2015)
- 22% (2016)
- 17% (2017)

Separate unit for online education
- 8% (2013)
- 6% (2014)
- 10% (2015)
- 8% (2016)
- 11% (2017)

Academic computing
- 7% (2013)
- 8% (2014)
- 5% (2015)
- 9% (2016)
- 11% (2017)
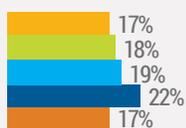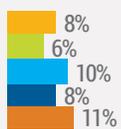
Other
- 4% (2013)
- 4% (2014)
- 3% (2015)
- 4% (2016)
- 3% (2017)
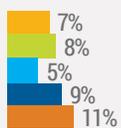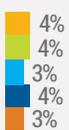
█ 2013   █ 2014   █ 2015   █ 2016   █ 2017

Reporting structure for course design and online learning continues to be volatile. The results show that reporting functions have decreased slightly from Provost or Chief Academic Officer, from 43 percent in 2016 to 40 percent in 2017, and reporting to the CIO decreased 6 percent from last year from 28 percent to 22 percent. This year's survey included a new category, "shared support between IT and academic departments." Twelve percent of the institutions responded that reporting functions for course design and online learning were shared between IT and academic departments. This additional response may have affected change in responses from previous years.

Changes to Reporting Structure for Course Design and Online Learning

Shared reporting between IT and academic departments
- 12% (2017)
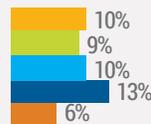
Dean level
- 10% (2013)
- 9% (2014)
- 10% (2015)
- 13% (2016)
- 6% (2017)

Separate unit for online education
- 17% (2013)
- 10% (2014)
- 15% (2015)
- 11% (2016)
- 14% (2017)

Provost or Chief Academic Officer
- 32% (2013)
- 38% (2014)
- 36% (2015)
- 43% (2016)
- 40% (2017)

CIO
- 34% (2013)
- 34% (2014)
- 28% (2015)
- 28% (2016)
- 22% (2017)
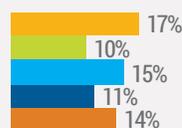
Other
- 7% (2013)
- 8% (2014)
- 10% (2015)
- 6% (2016)
- 7% (2017)
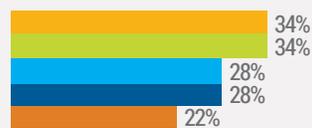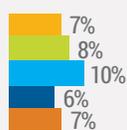
█ 2013   █ 2014   █ 2015   █ 2016   █ 2017

Support for Community Labs

The results indicate some difficulty in predicting the demand for community labs. Support and plans for community labs has decreased from 21 percent last year to 13 percent this year. Interestingly, the number of institutions that continue to increase support and plans for community labs also decreased from 15 percent last year to 11 percent this year. However, institutions that maintained the same support and plans for community labs for the past five years increased to 43 percent, which is a 10 percent jump from last year.

In summary, more than half (70 percent) of the Course/ Learning Management Systems are supplied by vendors, which is the highest percentage reported over the past six years. Sixty-seven percent of the institutions reported using their current Course/Learning Management Systems for more than five years. There is a slight shift in the reporting structure for course design and online learning where the Provost or Chief Academic Officer is the most likely choice, but 12 percent of the institutions reported sharing support between IT and academic departments. The responsibility and maintenance of the Course/Learning Management Systems and related infrastructure continues to reside in Central IT.

Changes to Community Lab Support and Plans

We no longer support community labs

- 3%
- 3%
- 5%
- 2%
- 6%

We are decreasing the number of community labs

- 20%
- 24%
- 16%
- 21%
- 13%

We are not increasing the numbers of labs but increasing the availability of hot sites for people to connect via LAN or Wi-Fi

- 36%
- 29%
- 28%
- 29%
- 27%

We have about the same as we had 5 years ago

- 29%
- 32%
- 34%
- 33%
- 43%

We continue to increase the numbers of labs available for general use

- 15%
- 12%
- 18%
- 15%
- 11%

■ 2013   ■ 2014   ■ 2015   ■ 2016   ■ 2017

INFRASTRUCTURE

Security

When it comes to Chief Security Officer (CSO), size and type of institution does matter. More than 84 percent of institutions with more than 10,000 students had a designated CSO while 91 percent of research universities had a CSO. They were followed by four-year institutions (67 percent), doctoral-granting institutions with (59 percent), two-year institutions (57 percent), and four-year master's degree programs (46 percent). Public institutions (71 percent) were much more likely to have someone designated as a CSO than private institutions (52 percent). As important as the topic of security is in 2017, we still do not have a 100 percent adoption rate in having one person on staff that has the title of CSO. With increasing security threats and the dependence on digital information, it is imperative to have a trained CSO in place. However, in all fairness, many smaller institutions may have someone functioning part time as a CSO without the title. The discrepancies may also be due to a greater focus on security at research universities because of the restrictions around securing research data and personal assurances required by data providers. Regardless of the number of students or if the institution is public or private, the clear majority of CSOs report to the CIO or IT organization lead.

Percentage of Institutions with a Designated Chief Security Officer, by Type of Institution

Not yet, but planning on identifying one in the next year

- Research university: 7%
- Doctoral-granting institution: 12%
- Four-year master's degree programs: 11%
- Four-year institution only: 0%
- Two-year institution: 7%

No

- Research university: 2%
- Doctoral-granting institution: 29%
- Four-year master's degree programs: 43%
- Four-year institution only: 33%
- Two-year institution: 36%

Yes

- Research university: 91%
- Doctoral-granting institution: 59%
- Four-year master's degree programs: 46%
- Four-year institution only: 67%
- Two-year institution: 57%
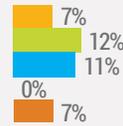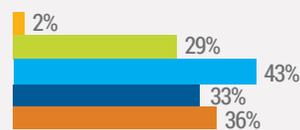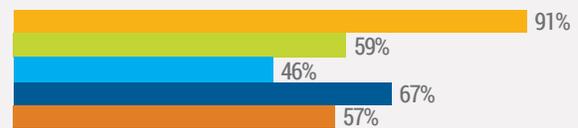
Legend:
- Research university
- Doctoral-granting institution
- Four-year master's degree programs
- Four-year institution only
- Two-year institution

For CIOs, the issues of security keeps many awake at night (26 percent), and CIOs overwhelmingly agree it is more difficult to manage and protect institutional information resources than in the past few years.

Percentage of Institutions with a Designated Chief Security Officer, by Size of Institution

Not yet, but planning on identifying one in the next year

- More than 25,000 students: 11%
- More than 10,000 students but less than 25,000 students: 6%
- 5,001 - 10,000 students: 9%
- 3,001 - 5,000 students: 8%
- 3,000 students or less: 9%

No

- More than 25,000 students: 9%
- More than 10,000 students but less than 25,000 students: 10%
- 5,001 - 10,000 students: 36%
- 3,001 - 5,000 students: 50%
- 3,000 students or less: 49%

Yes

- More than 25,000 students: 80%
- More than 10,000 students but less than 25,000 students: 84%
- 5,001 - 10,000 students: 55%
- 3,001 - 5,000 students: 42%
- 3,000 students or less: 43%

Legend:
- More than 25,000 students
- More than 10,000 students but less than 25,000 students
- 5,001 - 10,000 students
- 3,001 - 5,000 students
- 3,000 students or less

Security Issues

Are easier to manage and protect against
- 5%
- 2%

Are about the same to manage and protect against
- 17%
- 20%

Are more difficult to manage and protect against
- 72%
- 74%

Keep me awake at night
- 24%
- 26%

- 2016
- 2017

Phishing and ransomware attacks were added to the 2017 survey and more than half indicate that phishing attacks are more difficult to manage and require additional software, training, and policies and procedures. One CIO said "nothing is effective," while another said "we are plagued by phishing." Cyber insurance is used by almost 60 percent of institutions but only 1 percent indicated they had paid a ransom at this time.

Phishing Incidents

Are getting easier to manage
- 4%

Staying about the same
- 40%

Are getting more difficult to manage
- 55%

Ways Institutions are Managing Phishing

We have policies and guidelines to help protect against phishing attacks
- 64%

We have training programs for managing phishing
- 64%

We have good software to control phishing
- 54%

Other
- 9%

Ransomware Attacks

Are not a problem yet
- 46%

Are getting worse
- 55%

Ways Institutions are Managing Ransomeware

We have cyber insurance
- 59%

We have paid a ransom
- 1%

We have a training program for cyber attacks
- 49%

We have a plan for post-discovery steps
- 70%

35

Four-year institutions were more likely (93 percent) to complete a security audit than all other types of institutions, including research institutions (82 percent). The larger the institution (based on student FTE), the more likely they were to complete a security audit. Private institutions (81 percent) were more likely than public (78 percent) to have completed an audit. Two-year institutions were much more likely (56 percent) to plan an annual security audit than any other type of institution including research (40 percent), doctoral-granting (28 percent), four-year master's (36%), and four-year (21 percent). Research universities (73 percent) are more likely to have a formal IT security plan, followed by two-year institutions (57 percent), four-year master's (57 percent), doctoral-granting (56 percent) and four-year institutions (33 percent).

Percentage of Institutions That Have Completed a Security Audit, by Type

Thinking about it
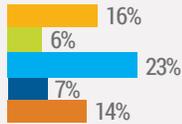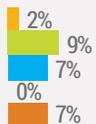
- 16%
- 6%
- 23%
- 7%
- 14%

No

- 2%
- 9%
- 7%
- 0%
- 7%

Yes

- 82%
- 85%
- 70%
- 93%
- 79%

- Research university
- Doctoral-granting institution
- Four-year with master's degree programs
- Four-year institution only
- Two-year institution

Percentage of Institutions That Have Completed a Security Audit, by Size

Thinking about it
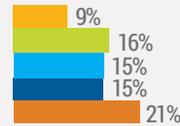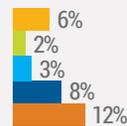
- 9%
- 16%
- 15%
- 15%
- 21%

No

- 6%
- 2%
- 3%
- 8%
- 12%

Yes

- 86%
- 82%
- 82%
- 77%
- 68%

- More than 25,000 students
- More than 10,000 students but less than 25,000 students
- 5,001-10,000 students
- 3,001-5,000 students
- 3,000 students or less

Costs for security support and applications continue to grow in spite of all the efforts to ensure our information resources are more secure. Most CIOs point to increased security costs (71 percent), while few acknowledge decreased costs for security (3 percent).

Change in Percentage of IT Budget Spent on Security Over the Past Five Years

Don't know
- 1%
- 1%
- 0%
- 1%
- 2%

Stayed the same
- 25%
- 26%
- 19%
- 19%
- 24%

Decreased
- 2%
- 2%
- 5%
- 3%
- 3%

Increased
- 71%
- 71%
- 76%
- 77%
- 71%

■ 2013   ■ 2014   ■ 2015   ■ 2016   ■ 2017
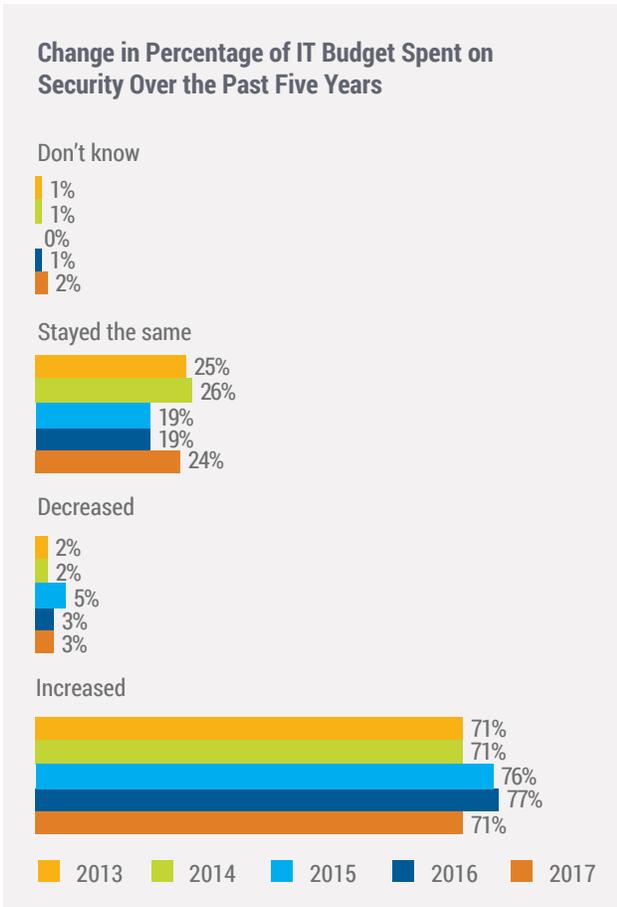
The deployment of video surveillance on campus is widespread as more than 90 percent of institutions indicate that they deploy it and another 2 percent are planning on deploying soon.

Percentage of Institutions That Deploy Video Surveillance on Campus

We are planning on deploying in the next year
- 2%

No
- 7%

Yes
- 91%
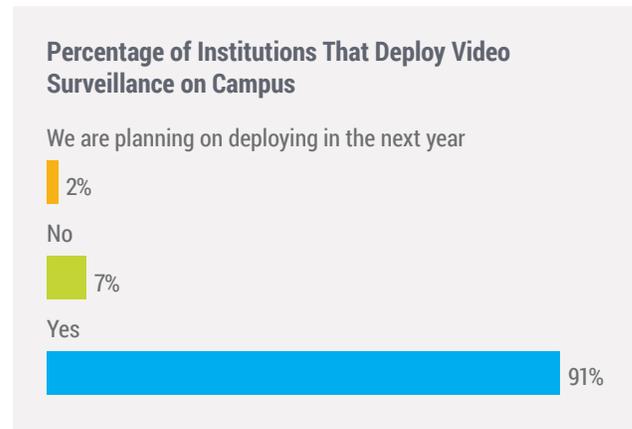
Incident Management

Most CIOs believe their institution is prepared for dealing with compliance issues, but more than two-thirds believe they must continue to work on the issue.

Institutions' Preparedness To Deal with eDiscovery, FERPA, HIPAA and Other Compliance

Not an issue in our country
- 3%

Not well prepared but working on it
- 11%
- 14%
- 13%

Prepared but continue to work on the issue
- 72%
- 70%
- 69%

Very well prepared
- 17%
- 16%
- 15%

■ 2015   ■ 2016   ■ 2017

37
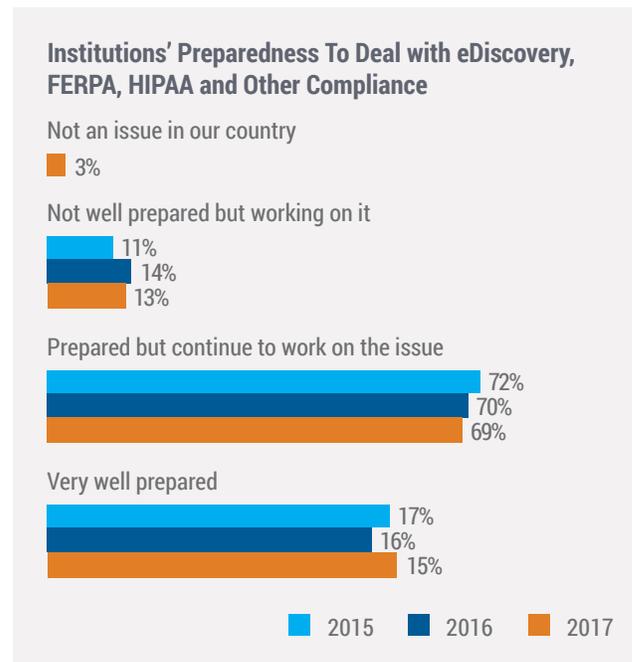
Plans to resume mission-critical operations in case of an incident are slightly down from previous years (75 percent versus 80 percent in 2016, and 81 percent in 2015 and 2014). For those institutions that have a plan, only 37 percent have tested the plan annually or more frequently.

Percentage of Institutions That Have a Plan to Resume Mission-Critical Operations in Case of a Crisis

Not yet but in process

Year	Value
2013	19%
2014	15%
2015	12%
2016	14%
2017	21%

No

Year	Value
2013	3%
2014	5%
2015	6%
2016	6%
2017	4%

Yes

Year	Value
2013	78%
2014	81%
2015	81%
2016	80%
2017	75%
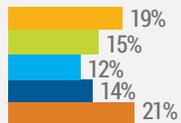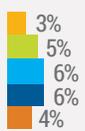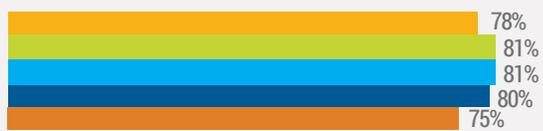
■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017

Frequency of Testing Plan to Resume Mission-Critical Operations

Tested less frequently than annually

Year	Value
2013	35%
2014	26%
2015	26%
2016	34%
2017	27%
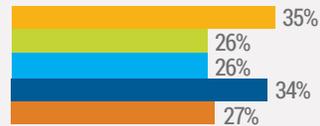
Tested more frequently than annually

Year	Value
2013	9%
2014	13%
2015	10%
2016	7%
2017	7%

Never been tested

Year	Value
2013	27%
2014	32%
2015	35%
2016	29%
2017	36%

Tested annually

Year	Value
2013	30%
2014	30%
2015	28%
2016	30%
2017	30%
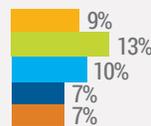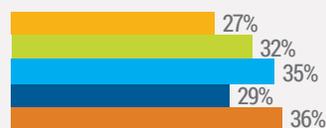
■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017

The number of institutions with fully redundant data centers is slowly rising, with "Yes-fully" and "Yes-partially" respondents now at 75 percent. This may reflect the increased use and/or consideration of Platform as a Service (PaaS) at 35 percent and Infrastructure as a Service (IaaS) at 44 percent. We will consider adding a few questions next year to see if there is a real link.

Percentage of Institutions With a Fully Redundant Data Center Where All Systems Could Be Up and Running in Less Than a Week

Yes, partially

- 2013: 40%
- 2014: 35%
- 2015: 33%
- 2016: 41%
- 2017: 48%

Planning stage

- 2013: 16%
- 2014: 14%
- 2015: 12%
- 2016: 8%
- 2017: 7%

No

- 2013: 26%
- 2014: 24%
- 2015: 25%
- 2016: 22%
- 2017: 18%

Yes, fully

- 2013: 18%
- 2014: 28%
- 2015: 30%
- 2016: 30%
- 2017: 27%

2013 2014 2015 2016 2017
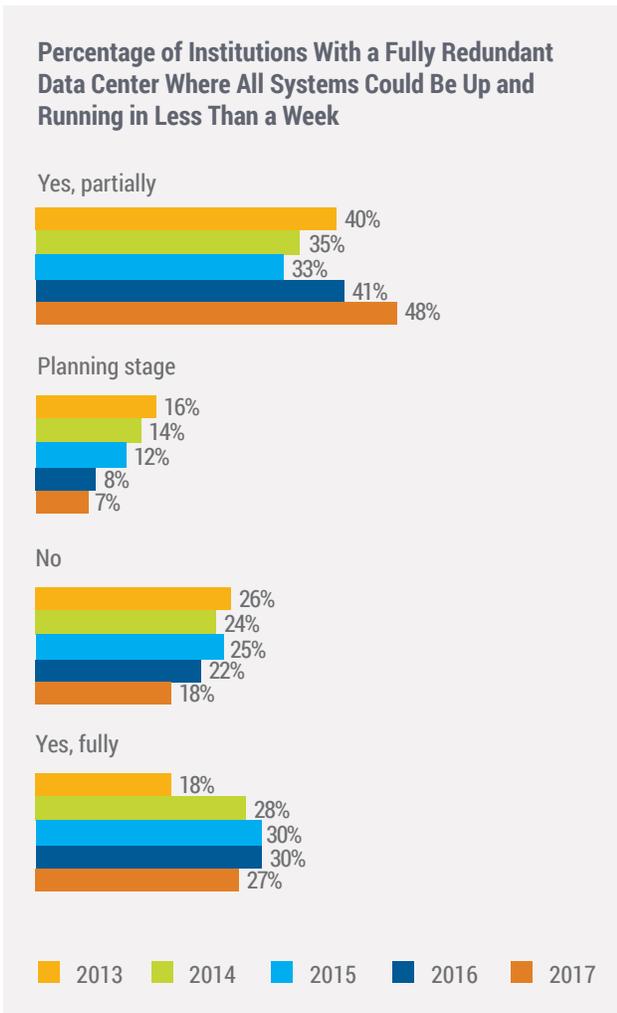
Penetration testing is down slightly from the past several years, but for those who have not done it or are not considering it has remained fairly constant over the past five years.

Institutions That Have Done Penetration Testing Using an Outside Firm

Considering

- 2013: 13%
- 2014: 13%
- 2015: 14%
- 2016: 12%
- 2017: 17%

No

- 2013: 21%
- 2014: 21%
- 2015: 20%
- 2016: 22%
- 2017: 22%

Yes

- 2013: 66%
- 2014: 67%
- 2015: 66%
- 2016: 65%
- 2017: 61%

2013 2014 2015 2016 2017
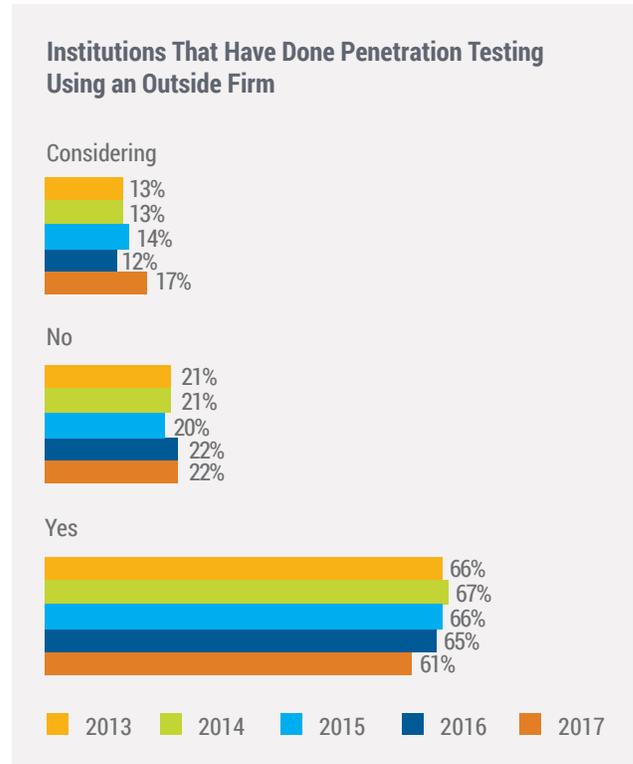
However, the use of Multi-Factor Authentication (MFA) is continuing to increase both in current use and plans. We believe that as phishing and ransomware attacks continue to increase, institutions will increase their use of MFA.

Institutions That Have Implemented a Multi-Factor Authentication Solution

Considering

- 34% — 2013
- 41% — 2014
- 43% — 2015
- 40% — 2016
- 46% — 2017

No

- 47% — 2013
- 41% — 2014
- 36% — 2015
- 27% — 2016
- 21% — 2017

Yes

- 20% — 2013
- 17% — 2014
- 21% — 2015
- 32% — 2016
- 33% — 2017
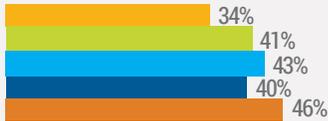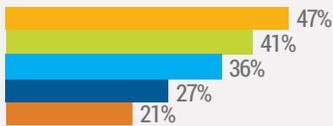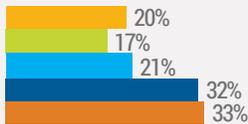
Legend: 2013 | 2014 | 2015 | 2016 | 2017

Other Observations

Document management is more likely managed at the institutional level (59 percent) than at the department level (41 percent). Looking back at the last four years, there seems to be movement toward managing as an institutional asset rather than an asset managed by a department.

How Document Management is Managed

At the departmental level

- 50% — 2014
- 53% — 2015
- 49% — 2016
- 41% — 2017

At the institutional level

- 50% — 2014
- 47% — 2015
- 51% — 2016
- 59% — 2017

Legend: 2014 | 2015 | 2016 | 2017

How Institutions Describe Document Management

Separate component on the IT stack

- 50% — 2014
- 49% — 2015
- 52% — 2016
- 51% — 2017

Integrative middleware for core academic and administrative systems

- 50% — 2014
- 51% — 2015
- 48% — 2016
- 49% — 2017

Legend: 2014 | 2015 | 2016 | 2017

Digital repository solutions are still not in mainstream use on campus, with only 36 percent of institutions reporting that they have one in place. Forty-four percent said that they do not have one while 20 percent indicate they are looking into one.

Percentage of Institutions That Utilize a Digital Repository Solution (DR)

Considering

- 25% — 2013
- 20% — 2014
- 27% — 2015
- 17% — 2016
- 20% — 2017

No

- 35% — 2013
- 39% — 2014
- 41% — 2015
- 48% — 2016
- 44% — 2017

Yes

- 40% — 2013
- 42% — 2014
- 32% — 2015
- 35% — 2016
- 36% — 2017
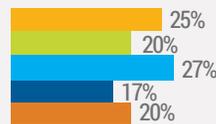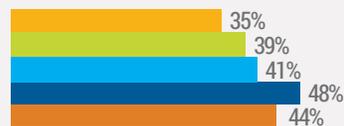
Legend: 2013 | 2014 | 2015 | 2016 | 2017

Sixty-seven percent of institutions that use a digital repository solution use a commercially available application compared with 33 percent that use an open-source solution. However, since only 36 percent of schools even have a solution, the percentage of all institutions using either type of solution is not as large as the number might indicate.

Descriptions of Digital Repository Solutions

Open-source solution
- 2013: 34%
- 2014: 37%
- 2015: 48%
- 2016: 48%
- 2017: 33%

Commercial application
- 2013: 66%
- 2014: 63%
- 2015: 52%
- 2016: 52%
- 2017: 67%

Legend: 2013 2014 2015 2016 2017
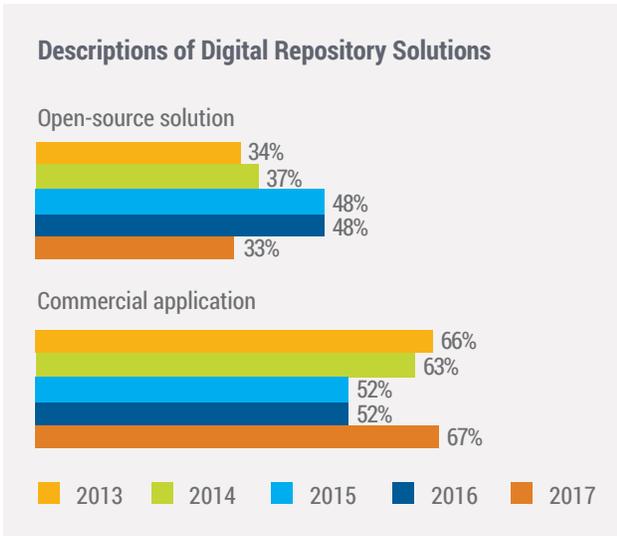
Virtualization

While the use of desktop virtualization has remained just above 50 percent in the past five years, there is a reduction in the number of campuses in the planning stages of desktop virtualization. In 2011, 37 percent of the campuses were planning for virtualization compared with only 14 percent in the 2017 survey. In 2017, 32 percent of CIOs reported their campuses were not using desktop virtualization. If they were using desktop virtualization, 80 percent were using VMware followed by 28 percent using Citrix and 16 percent using Microsoft. The leading responses for planning of desktop virtualization were to replace student labs (66 percent) and thin client solution for faculty and staff (54 percent).

Institutions Currently Utilizing Desktop Virtualization

In the planning stages
- 2013: 28%
- 2014: 23%
- 2015: 18%
- 2016: 16%
- 2017: 14%

No
- 2013: 22%
- 2014: 23%
- 2015: 27%
- 2016: 26%
- 2017: 32%

Yes
- 2013: 51%
- 2014: 54%
- 2015: 54%
- 2016: 58%
- 2017: 54%

Legend: 2013 2014 2015 2016 2017

Tools Institutions are Using for Desktop Virtualization

Microsoft
- 2013: 18%
- 2014: 17%
- 2015: 22%
- 2016: 23%
- 2017: 16%

Citrix
- 2013: 40%
- 2014: 42%
- 2015: 32%
- 2016: 28%
- 2017: 28%

VMware
- 2013: 72%
- 2014: 73%
- 2015: 73%
- 2016: 74%
- 2017: 80%

Other
- 2013: 3%
- 2014: 2%
- 2015: 3%
- 2016: 5%
- 2017: 0%

Legend: 2013 2014 2015 2016 2017

Descriptions of Plans for Desktop Virtualization

Used as a security strategy

- 26%
- 35%
- 37%
- 40%
- 33%
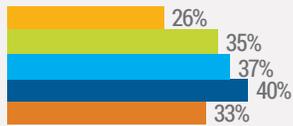
Used to support distance-education students

- 32%
- 33%
- 32%
- 29%
- 36%
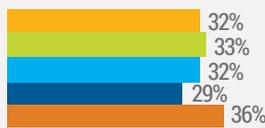
Used as a "bring your own device" solution

- 47%
- 47%
- 47%
- 47%
- 39%

Used mostly by students

- 32%
- 35%
- 41%
- 43%
- 43%
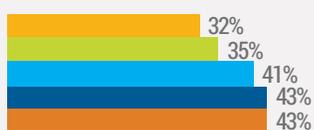
Used as a thin client solution for staff/faculty

- 58%
- 56%
- 59%
- 57%
- 54%

Used to replace student labs

- 66%
- 66%
- 65%
- 63%
- 66%

■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017

Standards

Central IT historically has provided campus IT standards, and there doesn't seem to be much movement since the 2012 survey. The real question might be whether the standards are being strictly adhered to or are they merely recommendations?

What Central IT Provides Selection Criteria and/or Standards for?

Servers

- 91%
- 88%
- 85%
- 86%
- 87%

Desktop computers

- 99%
- 97%
- 97%
- 97%
- 94%

Notebooks

- 87%
- 85%
- 87%
- 78%
- 82%

Tablets

- 55%
- 59%
- 52%
- 53%
- 53%

Smart phones

- 43%
- 47%
- 41%
- 35%
- 37%

■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017

42
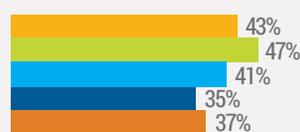
CLOUD COMPUTING

The use of cloud computing in higher education has seen significant growth over the past several years, and institutions are using the cloud for a variety of activities. Results of the survey suggest adoption of cloud services are being initiated by vendors moving their next generation of applications only to the cloud, at times with no supported local hosting option. While this can lead to efficiencies for schools running Software as a Service, there are typically no options for customization, which can be challenging in some use-case scenarios. Cloud-based activities range from common back-office systems such as email to advanced analytic cloud-based platforms. The barriers, particularly around security that initially inhibited cloud adoption, have all but vanished on many fronts. In many cases, cloud providers have security staffing and technologies that many individual institutions would be unable to afford. IT departments and higher-education leadership have embraced the cloud as a means to scale, efficiency, and in some cases, cost-cutting.

Survey trends in cloud computing include increased confidence in moving many applications and services to the cloud. While email, LMS, social networking, and desktop tools are common in the cloud, campuses are increasingly moving the portal, data center, CRM, alumni, financial applications, and data storage to the cloud. Minimal reductions over last year are in the areas of library management, alumni applications, and research management and support. The only notable negative change over last year's survey was in Course Management/LMS systems being hosted in the cloud, with a 5 percent reduction—64 percent compared with 69 percent. It will be interesting to watch for any change in LMS cloud changes in next year's survey.

There are many cloud providers out there, but several have risen to the top. Respondents reported that Amazon Web Services (71 percent), Microsoft Azure (66 percent) and Google Cloud (32 percent) dominate the general-purpose cloud services environment for all institutions regardless of size or type. A number of corporations offering cloud solutions have recognized they are unable to compete with the above-mentioned vendors and have migrated their platforms to them. Most institutions use cloud computing for a mix of academic and administrative needs with email, learning management systems, and cloud storage being the most popular to place in the cloud. It is notable that during the past seven years, no institution has reported using cloud computing or related services for community service/outreach activities.

Cloud Providers That Institutions are Currently Using or Considering

Oracle
11%

IBM
4%

Google Cloud Platform
32%

Microsoft Azure
66%

Amazon Web Services
71%

Other
6%
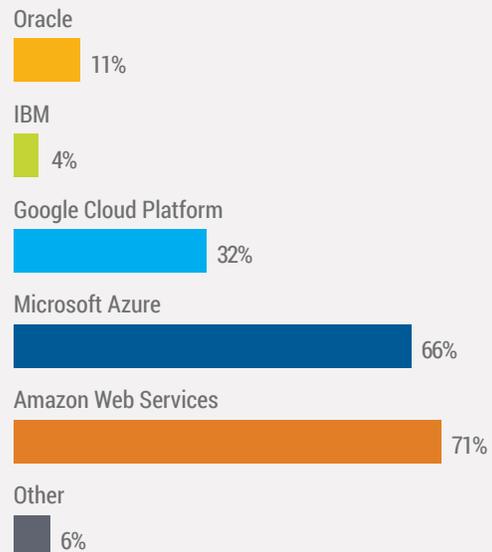
The most common cloud applications implemented were email, learning management systems, library management systems, customer relationship applications, and alumni systems. Data storage cloud adoption continues to grow, suggesting institutions are finding alternatives to Google and Microsoft attractive, with corporate offerings from Dropbox and Box.com becoming more mainstream as well. The adoption of cloud for ERP areas of finance and students system was the lowest of all applications. This may indicate CIOs were restricted by adequate or completed cloud offerings, budget constraints, or the task was too daunting. This may also be true for customizations that cannot be easily remedied in a multi-tenant SaaS cloud-based system. There are still some privacy and security concerns about the cloud for these applications.

Institutional size did not reveal major differences on how institutions use cloud computing, but there is a difference on cloud usage by the type of institution and public versus private. Use of the cloud was highest at two-year colleges (85 percent) followed by doctoral-granting institutions (78 percent), research institutions (74 percent), four-year institutions (60 percent), and four-year with some grad-uate programs (55 percent). Further research is needed to identify the factors promoting implementation of cloud computing at private nonprofit universities. A rationale for

the difference might lie in the mandatory request for bid process (RFP) required at public universities. Lower costs for cloud applications or relatively small staffing levels may be driving private universities and two-year colleges to earlier adoption by shifting the responsibility of maintenance of on premise systems to a cloud-based vendor. This frees up campus staff to focus on technol-ogy projects that can differentiate their institution and strengthen support for academic areas.

Areas Currently Being Placed in the Cloud or That are in the Process of Being Placed in the Cloud, Private vs. Public Institutions

Video security
- Private, non-profit: 3%
- Public: 2%

Research management and support
- Private, non-profit: 13%
- Public: 18%

Business continuity/disaster recovery
- Private, non-profit: 28%
- Public: 29%

Records management
- Private, non-profit: 9%
- Public: 9%

Content management
- Private, non-profit: 22%
- Public: 22%

Data storage
- Private, non-profit: 42%
- Public: 50%

CRM
- Private, non-profit: 70%
- Public: 47%

Course/learning management
- Private, non-profit: 69%
- Public: 62%

Student applications
- Private, non-profit: 34%
- Public: 22%

Financial applications
- Private, non-profit: 14%
- Public: 27%

Alumni applications
- Private, non-profit: 50%
- Public: 24%

Library applications
- Private, non-profit: 45%
- Public: 35%

Desktop tools (i.e. MS Office)
- Private, non-profit: 48%
- Public: 50%

Data center
- Private, non-profit: 23%
- Public: 20%

Portal
- Private, non-profit: 25%
- Public: 32%

Social networking
- Private, non-profit: 61%
- Public: 44%

Email
- Private, non-profit: 94%
- Public: 88%

Other
- Private, non-profit: 3%
- Public: 7%

■ Private, non-profit ■ Public

Areas Currently Being Placed in the Cloud or That are in the Process of Being Placed in the Cloud, by Type of Institution

Video security
- 0%
- 6%
- 2%
- 0%
- 4%

Research management and support
- 30%
- 18%
- 4%
- 13%
- 4%

Business continuity/disaster recovery
- 20%
- 27%
- 35%
- 20%
- 33%

Records management
- 7%
- 15%
- 10%
- 13%
- 22%

Content management
- 25%
- 15%
- 25%
- 20%
- 37%

Data storage
- 50%
- 48%
- 44%
- 53%
- 44%

CRM
- 52%
- 64%
- 58%
- 60%
- 44%

Course/learning management
- 68%
- 58%
- 67%
- 53%
- 67%

Student applications
- 16%
- 24%
- 25%
- 47%
- 41%

Financial applications
- 25%
- 21%
- 15%
- 13%
- 33%

Alumni applications
- 27%
- 39%
- 35%
- 60%
- 22%

Library applications
- 25%
- 42%
- 42%
- 47%
- 44%

Desktop tools (i.e. MS Office)
- 61%
- 48%
- 38%
- 60%
- 44%

Data center
- 30%
- 24%
- 13%
- 27%
- 15%

Portal
- 32%
- 24%
- 27%
- 27%
- 41%

Social networking
- 48%
- 52%
- 54%
- 60%
- 41%

Email
- 91%
- 91%
- 92%
- 87%
- 85%

Legend:
- Research university
- Doctoral-granting institution
- Four-year with master's degree programs
- Four-year institution
- Two-year institution

Factors Influencing the Use of Cloud Computing

Institutions indicated many factors influence their usage of cloud computing, with access to data/information in the cloud the top choice. As noted in past reports, saving money, getting new activities online quickly, and protecting sensitive information are the most frequently cited influences. However, the concern with accessing information in the cloud decreased to 65 percent in 2016 from 73 percent in 2015 and remained flat in 2017. Security and the protection of cloud-based data continues to become a lower concern in recent years, suggesting institutions recognize cloud-based data is often considered equally safe if not more so than campus-based data. Saving money through the cloud dropped as a cloud influencer from 68 percent in 2016 to 61 percent in 2017. Executive leadership pushing the use of the cloud, a new category in 2017, was reported at 19 percent as a cloud influencer.

Cloud-Computing Influencers

Saving money through the use of cloud computing

- 69%
- 71%
- 71%
- 68%
- 61%

Concern about security

- 66%
- 64%
- 68%
- 67%
- 65%

Concern about privacy

- 56%
- 57%
- 66%
- 52%
- 52%

Ownership of data

- 55%
- 55%
- 63%
- 52%
- 58%

Protection of sensitive data/information

- 68%
- 70%
- 73%
- 66%
- 66%

Access to data/information in the cloud

- 57%
- 64%
- 73%
- 65%
- 58%

Ability to bring new activities online quickly

- 60%
- 73%
- 71%
- 61%
- 65%

Staffing limitations

- 51%
- 45%

Agility

- 65%

Executive leadership pushing the use of the cloud

- 19%

Other (please specify)

- 6%
- 5%
- 9%
- 5%
- 7%

■ 2013   ■ 2014   ■ 2015   ■ 2016   ■ 2017

47
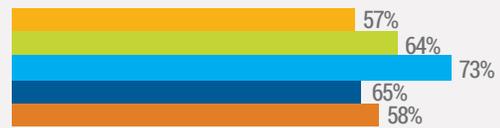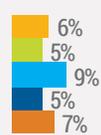
Use of Cloud Computing by Institution Classification

Research universities reported the ability to bring new activities online as their second-highest influencing factor at 77 percent, while two-year institutions had the lowest concern about the executive leadership pushing the use of cloud with only 25 percent indicating it as an influence. Doctoral-granting institutions had the lowest percentage (47 percent) when it came to concerns about privacy. Two-year institutions have been hard hit by the recovery of the economy and students leaving school and going back to work. This, in combination with decreased funding, has put two-year institutions under extreme pressure to become more efficient and likely propelled a move to the cloud in many cases. The top influencers for doctoral-granting institutions were the same as the 2016 survey which identified bringing new applications online quickly.

Cloud-Computing Influencers by Type of Institution

Executive leadership pushing the use of the cloud
- 20%
- 15%
- 16%
- 20%
- 25%
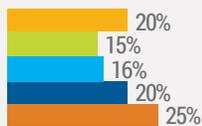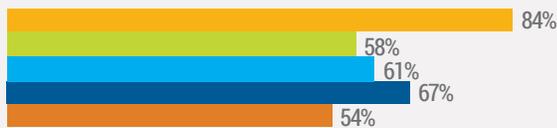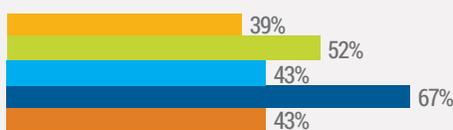
Protection of sensitive data/information
- 70%
- 61%
- 64%
- 67%
- 68%

Agility
- 84%
- 58%
- 61%
- 67%
- 54%

Ownership of data
- 61%
- 55%
- 63%
- 47%
- 54%

Staffing limitations
- 39%
- 52%
- 43%
- 67%
- 43%

Concern about privacy
- 55%
- 42%
- 55%
- 47%
- 54%

Ability to bring new activities online quickly
- 77%
- 67%
- 57%
- 67%
- 57%

Concern about security
- 61%
- 58%
- 70%
- 73%
- 64%

Access to data/information in the cloud
- 55%
- 64%
- 59%
- 53%
- 57%

Saving money through the use of cloud computing
- 59%
- 64%
- 63%
- 67%
- 54%

- Research university
- Doctoral-granting institution
- Four-year with master's degree programs
- Four-year institution
- Two-year institution

When reporting on factors influencing cloud computing, smaller institutions (3000 students or less) cited saving money (66 percent) and concern about security (66 percent), while larger institutions reported saving money and the ability to bring new activities online quickly were major influencers.

Cloud Computing Impact on Budget

Competition in the cloud is fierce, and price wars between Amazon, Google, Microsoft, Rackspace, etc., have driven costs down continuously for many cloud-based services. Institutions need to ensure they are not signing long-term contracts with pricing locked or they will almost certainly overspend given the commoditization of cloud services. Over the past four years, most institutions expected a moderately positive impact on the budget when using cloud computing; however, the overall expectation of very positive and moderately positive impact on budget fell in 2017 from 2012. Results from the survey in 2017 suggest that the larger the institution, the more opportunities for savings increase.

Expectations of How Cloud Computing will Impact the Budget in the Future

Very negative (will cost more than we currently spend)
- 11%
- 2%
- 6%
- 4%
- 11%

Somewhat negative
- 11%
- 15%
- 13%
- 35%
- 14%
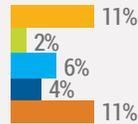
Neutral on budget
- 31%
- 33%
- 38%
- 35%
- 40%
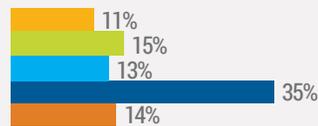
Moderately positive
- 46%
- 35%
- 41%
- 27%
- 34%
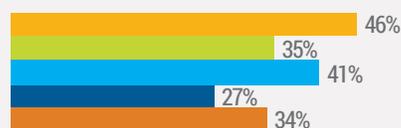
Very positive (save money)
- 0%
- 15%
- 3%
- 0%
- 0%

- More than 25,000 students
- More than 10,000 students but less than 25,000 students
- 5,001 - 10,000 students
- 3,001 - 5,000 students
- 3,000 students or less

49

Most institutions expect cloud computing to have a moderately positive or neutral impact on budgets, with the exception of institutions with 3,000-5,000 students of which 35 percent expect a somewhat negative budget impact. While the numbers have changed slightly during the past five years, the numbers overall are reasonably consistent during that period, and CIOs appear to be guarded on the value as well as the impact on budget.

Applications in the Cloud

Email continues to be the primary application moved to the cloud with over 90 percent of institutions indicating that they have placed it into the cloud or are in the process of doing so, up from 81 percent in 2013. The area with the most significant increase of usage between 2013 and 2017 is in the use of desktop tools, i.e., likely due to the maturity of online office applications like Microsoft Office365 and Google Apps and the speed of adoption in higher education for low or no cost. The use of cloud computing for applications seems to have stabilized and there is minimal growth reported.

Data from the past few years shows considerable growth in the use of the cloud for course/learning management (64 percent in 2017 up from 24 percent in 2012), alumni applications (about 34 percent in 2017 up from 21 percent in 2012) with smaller institutions leading the migration, library applications (39 percent in 2017 up from 28 percent in 2012), and desktop tools (near 49 percent in 2017 up from 22 percent in 2013).

Areas Currently Being Placed in the Cloud or are in the Process of Being Placed in the Cloud by Institutional Size

Video security
- 3%
- 0%
- 3%
- 4%
- 3%
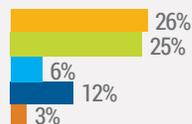
Research management and support
- 26%
- 25%
- 6%
- 12%
- 3%

Business continuity/disaster recovery
- 31%
- 25%
- 34%
- 36%
- 16%

Records management
- 14%
- 13%
- 9%
- 16%
- 10%
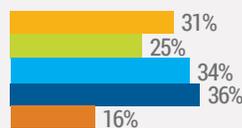
Content management
- 23%
- 29%
- 25%
- 28%
- 16%
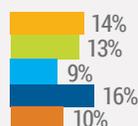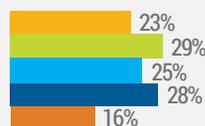
Data storage
- 57%
- 56%
- 41%
- 40%
- 35%
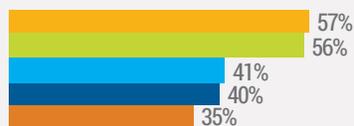
- More than 25,000 students
- More than 10,000 students but less than 25,000 students
- 5,001 - 10,000 students
- 3,001 - 5,000 students
- 3,000 students or less

Areas Currently Being Placed in the Cloud or are in the Process of Being Placed in the Cloud by Institutional Size (cont.)

CRM

- 49%
- 52%
- 56%
- 56%
- 68%

Desktop tools (i.e. MS Office)

- 57%
- 52%
- 41%
- 40%
- 52%

Course/learning management

- 57%
- 65%
- 75%
- 64%
- 61%

Data center

- 31%
- 27%
- 19%
- 12%
- 10%

Student applications

- 23%
- 15%
- 31%
- 28%
- 45%

Portal

- 34%
- 35%
- 28%
- 32%
- 16%

Financial applications

- 29%
- 25%
- 25%
- 12%
- 13%

Social networking

- 43%
- 50%
- 56%
- 52%
- 52%

Alumni applications

- 17%
- 27%
- 22%
- 52%
- 45%

Email

- 86%
- 90%
- 100%
- 88%
- 87%

Library applications

- 34%
- 29%
- 44%
- 32%
- 58%

- More than 25,000 students
- More than 10,000 students but less than 25,000 students
- 5,001 - 10,000 students
- 3,001 - 5,000 students
- 3,000 students or less

Changes in Areas Being Placed in the Cloud or That are in the Process of Being Placed in the Cloud

Video security
2%

Research management and support
18%
16%

Business continuity/disaster recovery
26%
25%
23%
26%
28%

Records management
0%
0%
6%
8%
12%

Content management
0%
0%
22%
21%
25%

Data storage
36%
34%
38%
47%

CRM
23%
29%
33%
44%
56%

Course/learning management
44%
50%
61%
69%
64%

Student applications
9%
15%
24%
19%
27%

Financial applications
5%
15%
13%
15%
22%

Alumni applications
21%
27%
35%
35%
34%

Library applications
34%
38%
39%
42%
39%

Desktop tools (i.e. MS Office)
22%
33%
45%
49%
49%

Data center
13%
13%
18%
15%
21%

Portal
15%
20%
23%
26%
30%

Social networking
44%
40%
49%
45%
50%

Email
81%
87%
86%
90%
90%

Other
8%
8%
7%
3%
6%

■ 2013   ■ 2014   ■ 2015   ■ 2016   ■ 2017

BIG DATA

The big story about Big Data is that there isn't much of a story this year. The hype seems to have faded and most institutions of all size, type, and funding type (public versus private) do not have a Big Data strategy. Those who have a strategy and use Big Data tend to be larger and more complex institutions. Almost two-thirds of the institutions indicated they do not have a Big Data strategy (60 percent) and are not working on one. Institutional classification continues to be a determining factor, as research universities are more likely to have a strategy or be working on one than the other types of institutions.

Presence of Big Data Strategy

Working on one
- 30%
- 26%
- 35%
- 28%
- 25%

No
- 53%
- 61%
- 49%
- 56%
- 60%

Yes
- 17%
- 13%
- 16%
- 16%
- 15%

■ 2013   ■ 2014   ■ 2015   ■ 2016   ■ 2017

Presence of Big Data Strategy, by Institution Type

Working on one
- 39%
- 21%
- 22%
- 20%
- 18%

No
- 36%
- 76%
- 64%
- 67%
- 68%

Yes
- 25%
- 3%
- 15%
- 13%
- 14%

■ Research university
■ Doctoral-granting institution
■ Four-year with master's degree programs
■ Four-year institution
■ Two-year institution
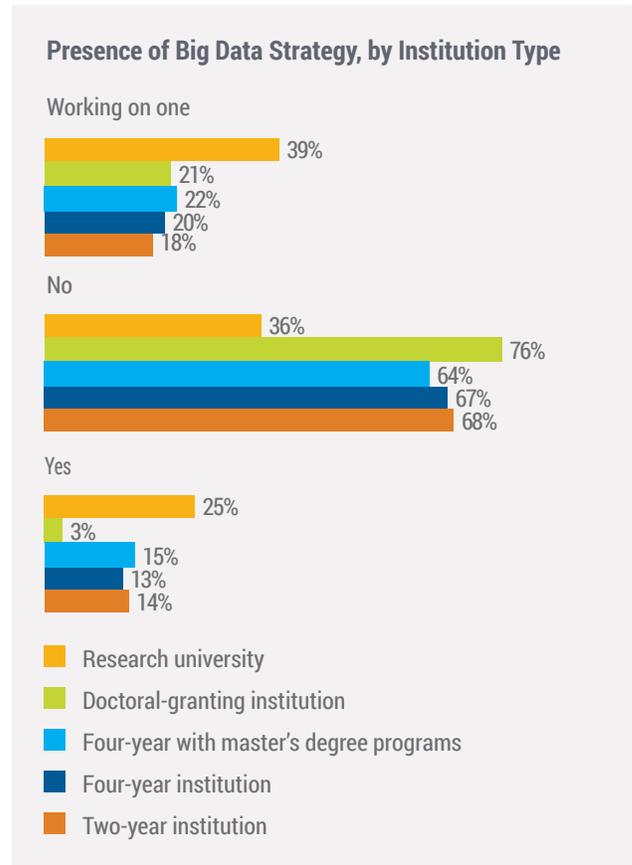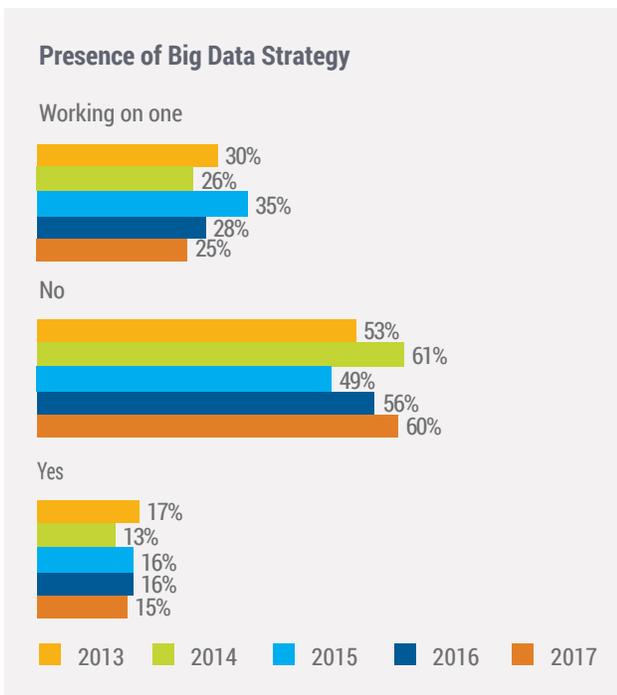
Size of the institution also seems to be important as larger institutions (10,000 students or more and more than 25,000 students) are more likely to have a Big Data strategy or are working on one (55 and 65 percent respectively) than other institutions (less than 30% for all others).

Big Data Usage

Higher education institutions leverage Big Data for different uses. The greatest use is now reported in teaching and learning analytics (57 percent, up from 49 percent in 2015 and 45 percent in 2013), administrative decision-making (57 percent, up from 54 percent in 2014) and research (57 percent).
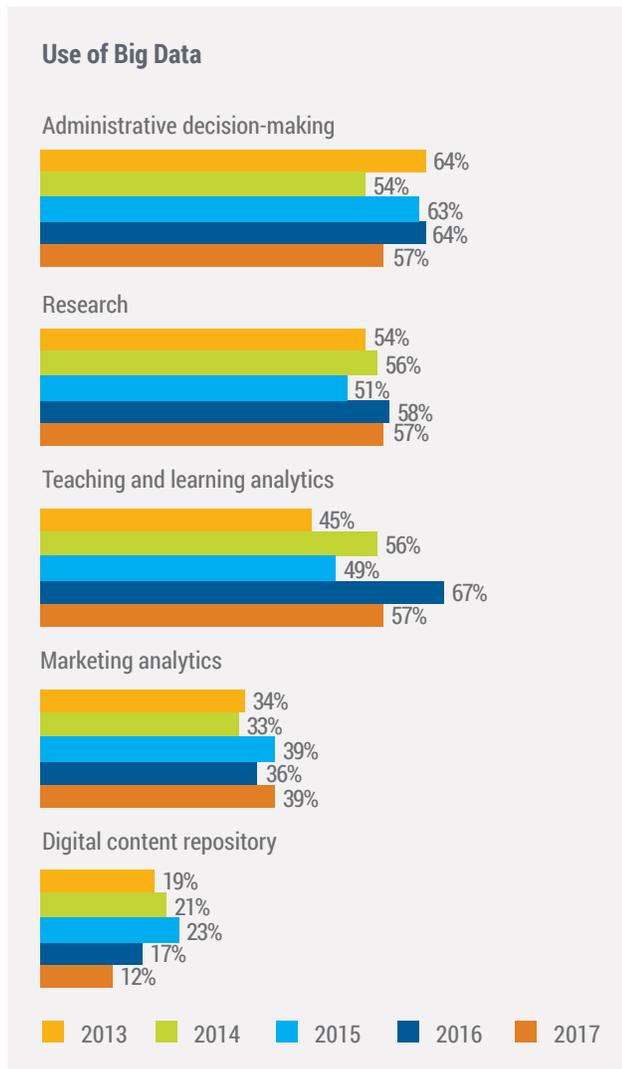
Research institutions reported higher use of Big Data in research (78 percent) and teaching and learning analytics (65 percent) but lower use of Big Data for digital content repository (11 percent). However, two-year institutions were more likely to use Big Data for administrative decision-making (83 percent) and research (55 percent).

Use of Big Data

Administrative decision-making
- 64%
- 54%
- 63%
- 64%
- 57%

Research
- 54%
- 56%
- 51%
- 58%
- 57%

Teaching and learning analytics
- 45%
- 56%
- 49%
- 67%
- 57%

Marketing analytics
- 34%
- 33%
- 39%
- 36%
- 39%

Digital content repository
- 19%
- 21%
- 23%
- 17%
- 12%

■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017

Use of Big Data by Type of Institution

Research
- 78%
- 44%
- 38%
- 71%
- 55%

Teaching and learning analytics
- 65%
- 56%
- 56%
- 43%
- 45%

Administrative decision-making
- 49%
- 56%
- 53%
- 86%
- 83%

Marketing analytics
- 27%
- 44%
- 50%
- 29%
- 45%

Digital content repository
- 11%
- 11%
- 13%
- 29%
- 9%

■ Research university
■ Doctoral-granting institution
■ Four-year with master's degree programs
■ Four-year institution
■ Two-year institution

Size also seems to be a factor, as larger institutions tend to leverage Big Data for teaching and learning analytics, administrative decision-making and research while smaller institutions utilizing Big Data tend to replace research with marketing analytics.
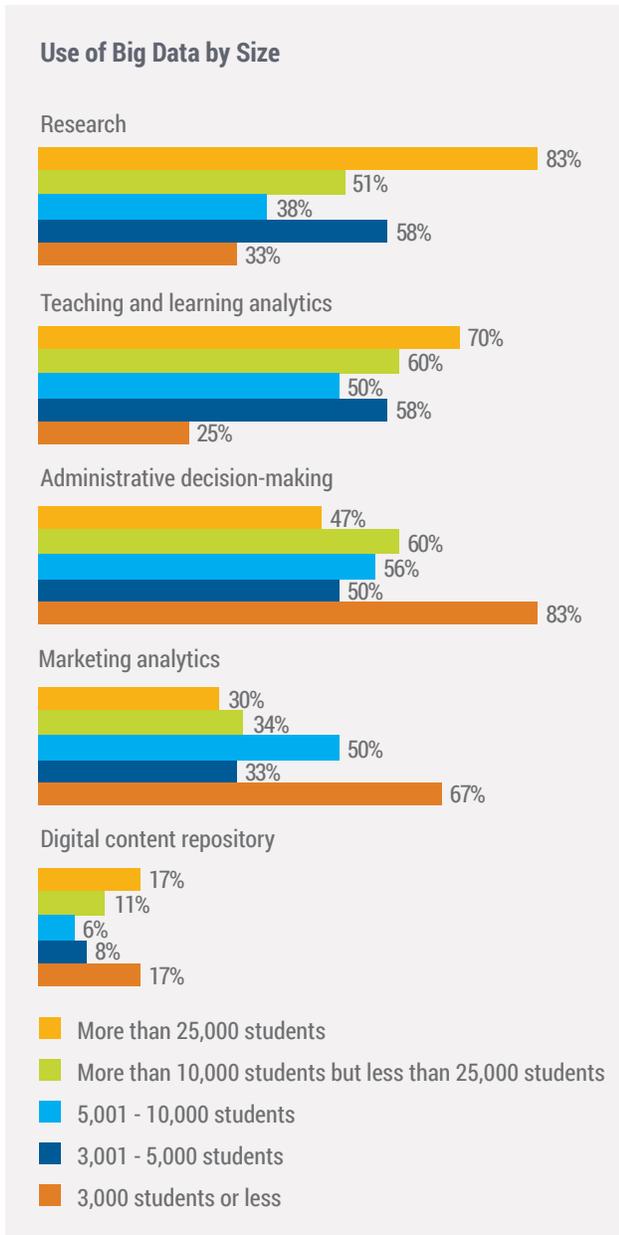
Big Data Impact

Big Data continues to have the largest impact on data storage (73 percent down from 78 percent in 2016). However, security concerns are growing year after year (up from 43 percent in 2013 to 59 percent in 2017) and campus culture and internal/external collaborations are next on this year's list.

Use of Big Data by Size

Research
- 83%
- 51%
- 38%
- 58%
- 33%

Teaching and learning analytics
- 70%
- 60%
- 50%
- 58%
- 25%

Administrative decision-making
- 47%
- 60%
- 56%
- 50%
- 83%

Marketing analytics
- 30%
- 34%
- 50%
- 33%
- 67%

Digital content repository
- 17%
- 11%
- 6%
- 8%
- 17%

- ■ More than 25,000 students
- ■ More than 10,000 students but less than 25,000 students
- ■ 5,001 - 10,000 students
- ■ 3,001 - 5,000 students
- ■ 3,000 students or less

If Institutions are Using an Institutional Repository (IR) The Following Content is Included:

Research analytics
- 6%
- 9%

Researcher's assessment support facilities
- 8%
- 10%

Researcher's curriculum vitae
- 19%
- 13%

Learning objects
- 9%
- 15%

Dissertations and thesis
- 28%
- 25%

Patents
- 5%
- 3%

Projects
- 9%
- 19%

Scientific datasets
- 10%
- 11%

APC's (article processing charges)
- 3%
- 5%

Scientific publication's full text
- 31%
- 28%

Scientific publication's metadata
- 25%
- 22%

Don't have an IR
- 55%
- 53%

- ■ 2016
- ■ 2017

55

WHAT KEEPS CIOs AWAKE AT NIGHT?

For the third year we have asked the question "What is the one issue that weighs heavily on you or keeps you awake at night?" For the third year, security and related privacy issues are at the top. More than 40 percent listed security and privacy issues, a very slight downtick compared with 41 percent in 2016, but still significantly up from 31 percent in 2015. Staffing issues, including retaining and recruiting skilled people, is second again (19 percent) in 2017 as it was in 2016 (24 percent) and 2015 (13 percent). On the other hand, budget concerns are the fourth-biggest issue at 6 percent, but that's down from 14 percent in 2016 and 13 percent in 2015. The one other area that is of deep concern to CIOs is that demand for IT services and support is greater than the ability of the IT organization to meet that demand.

Issue That Weighs Most Heavily on CIOs

Security issues
40%

Recruiting and retaining talent
19%

Demand exceeds ability to deliver
9%

Budget concerns
6%

Business continuity
5%
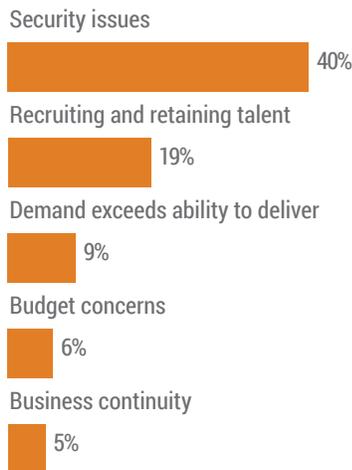
A few interesting responses include:

"Delivery of services to support campus innovation while maintaining stable operations."

"Diminishing budget/resources with increasing expectations and the shift of most expenses from capital to operating."

"I am greatly concerned by the mismatch between the rapid increase in expectations for the technology environment at the university and the university's willingness to provide the resources necessary to address those expectations."

"Maintaining currency, staffing, professional development and innovative projects in the face of declining resources."

"The institution's inability to fund even basic infrastructure needs. What we have is almost all past its useful life (desktops, network, and data center) with no funding in sight."

"What will education and technology look like in eight to 10 years? Are we doing enough to get there ahead of schedule? Will legislatures make decisions for us?"

What One Technology Will CIOs Have to Invest in During the Next Five Years?

The question "What One Technology Will CIOs Have to Invest In During The Next Five Years?" was asked for the third year. The results for 2017 are in line with the results from 2015. Security came out on top, cloud computing was second, analytics came in third and network and infrastructure came in fourth. However, the results from 2016 included teaching and learning technologies in the top four.

	2015	2016	2017
Security	30%	19%	22%
Cloud computing	19%	13%	20%
Analytics/big data	17%	16%	14%
Network and infrastructure	9%	8%	7%
Teaching and learning tech	5%	13%	3%

As with the prior years, security is not one technology but CIOs have indicated that the investments for new technologies must include IT to support security and privacy issues.

SUMMARY

The challenges facing higher-education CIOs are many and diverse. Hopefully this year's LBCIO survey will provide CIOs with insights and peer information to help manage an IT organization that is growing in demand for services and support while holding on to financial and human resource constraints.

One of the goals of formal higher education from the beginning was to protect the integrity of the institution and the physical security of students, faculty, and staff. Security continues to be a major concern for CIOs in higher education. CIOs protect and deal with attacks from all corners of the globe. Some attacks are made for financial gains (ransomware and phishing are examples), while other attacks hit at the integrity of the institution including personal privacy, grades, evaluations, research and even class discussions. It is no wonder that many CIOs are kept awake at night with concerns for security.

The concern for security has long been a major concern for CIOs. The CAUSE Current Issues Forum of 1984 listed security as the number one concern for IT leaders and security has continued to be a major concern up to the present on the EDUCAUSE Top 10 List. Every new and innovative technology that is brought on campus must be secure and support the mission and integrity of the institution. Meanwhile, CIOs have an obligation to provide an open environment where any device can be connected from any place on the globe. As the late CIO from Virginia Tech and EDUCOM president, Dr. Robert Heterick, once said, "The nice thing about standards in higher education is that there are so many of them." No other industry must be as open and available globally and at the same time secure its information resources literally "forever." Transactions in higher education must be protected beyond the life of both the individual and even the institution. When an institution dies, the transcripts of all students must live on and be protected! This year's survey continues to see security as the leading issue facing CIOs.

CIOs in higher education are dealing with massive amounts of technical and cultural change. The role of the cloud has been moving forward, and over the past eight years

of the LBCIO survey, administrative applications were not likely to be moved to the cloud. Data this year suggests that the wall is being broken down and more institutions are investing in cloud-based administrative applications. However, moving administrative and personal information to the cloud is not without concerns. One CIO from a large state system said "I have this feeling that once you do move an app to the cloud you are pretty much locked in. It's a bit like OPEC, they raise the price of oil and there is nothing you can do about it. Another big thought running around in my head is 'where will we be in the next 20-40 years?' I personally believe we will continue to see radical changes in almost every aspect of our daily life. From the potential of technological improvements coupled with social media impacting our personal and family life to potential changes in the way the current institutions like higher ed operate. Are we preparing ourselves for that level of change?"

We know that this or any other survey cannot really address all of the issues facing higher education and CIOs in higher education but we hope that this report from the 2017 LBCIO survey will help CIOs plan for the future and better manage their IT organizations and resources.

If you would like more information about the survey or the Leadership Board for CIOs in Higher Education, or would like to become a member of LBCIO, please contact:

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Mobile +1 303 807 9408
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Or visit the LBCIO website at:
www.lbcio.org

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University of Nebraska

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Student Information Sheet

Academic Year * 2016
Student ID * 20150622
First Name Linda
Last Name Ding
Date of Birth 01/01/1993
Email Address Linda.Ding@laserficheuniversity.edu
Phone Number (562) 988-1688

Which of the following applies to you?
You must meet one of the following qualifications in order to be eligible for scholarship.

- ● High school graduate
- ○ Completed home-school program
- ○ Earned GED certificate
- ○ Passed State High School Proficiency Exam

ENROLLMENT MANAGEMENT

Admissions
Financial Aid
Registrar Forms Processing
Academic Advising
Student Records Management
Student Onboarding

BUSINESS ADMINISTRATION

Accounts Payable
Vendor Management
Contract Management
Procurement & Purchasing
Human Resources
Facilities Management

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Grant Administration
Advancement Services
Athletics
Faculty Administration
Information Technology
Communication Management

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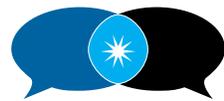
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