

INFORMATION TECHNOLOGY IN HIGHER EDUCATION 2016

EXECUTIVE
SUMMARY

SURVEY OF CHIEF INFORMATION OFFICERS

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Leadership Board for CIO's

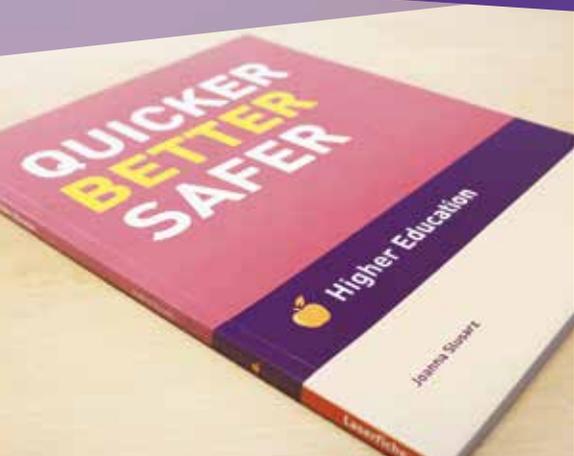
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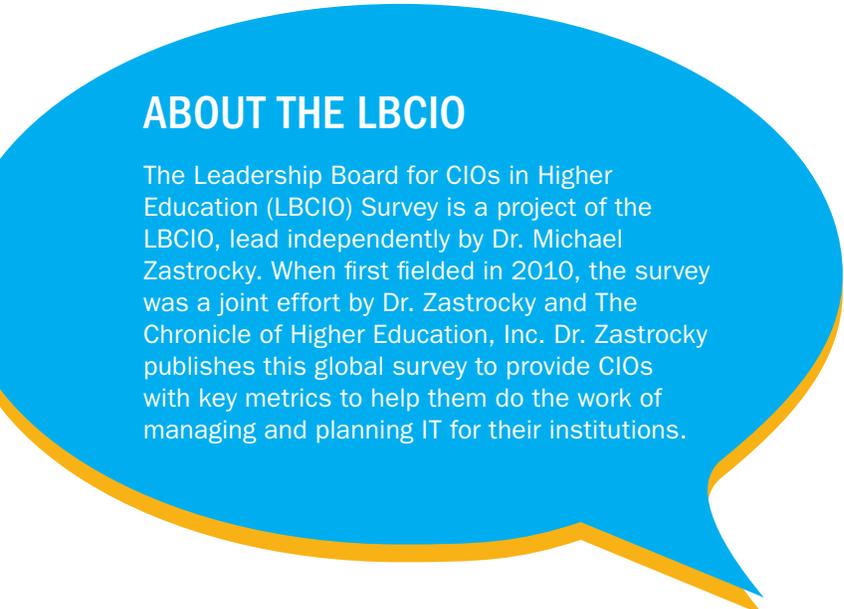


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ABOUT THE LBCIO

The Leadership Board for CIOs in Higher Education (LBCIO) Survey is a project of the LBCIO, lead 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.

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INTRODUCTION

This, the seventh annual global LBCIO survey of Chief Information Officers (CIOs) in higher education, provides us with a look at how the role of the CIO is changing in higher education and some of the complexities that make the role of CIO challenging and at times frustrating for the people in that role. Budget concerns and issues are still an important part of the frustrations, but security was listed first as the issue that keeps the CIO awake at night. The rapid pace of change and the ability to hire, retain, and train staff who can handle that pace are also major concerns for many CIOs in higher education.

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 2016, collecting strategic and tactical information on major issues facing higher education CIOs. 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
- Strategic planning for IT
- Academic technologies, MOOCs 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: John Barden, CTO and Deputy CIO, University of Rochester; Reid Christenberry, CIO Emeritus, Tennessee Technological University; Dr. Paul Czarapata, CIO, Kentucky Community and Technical College System; Leonard De Botton, CIO, Berkeley College; Dr. Jan Fox, CIO Emeritus, Marshall University; Dr. Doyle Friskney, CTO, University of Kentucky; Dr. Vince Kellen, CIO, University of California at San Diego; Don Mihulka, Associate CIO, University of Nebraska; Brigitte Mudukuti, Associate CIO, Texas Wesleyan University; Judy Molnar, CIO, Austin Peay State University; Dr. David Rotman, CIO, Cedarville University; Dr. Tina Stuchell, Director of IT and CIO, University of Mount Union; and Ben Zastrocky, Senior Advisor to LBCIO.

INSTITUTIONAL AND CIO CHARACTERISTICS

2016 Survey Respondent Demographics

The 2016 survey was sent to almost 1,000 CIOs globally, and the response rate was about 20 percent. The survey was conducted for a period of three weeks during April and May 2016.

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

Research Universities	26%
Doctoral-Granting institutions	23%
Four-year institutions with master's degree	31%
Four-year institutions without master's degree	12%
Two-year institutions	8%

The size of the responding institutions varied, with 23 percent having enrollment of 3,000 students or less, over 15 percent with 3,001-5,000 students, 17 percent between 5,001 and 10,000, 25 percent with enrollment of 10,001-25,000 students, and 20 percent at more than 25,000 students. The global breakout is as follows: North America, 86 percent; Europe, 10 percent; Australasia, 3 percent; and Africa, 1 percent.

CIO Responsibilities

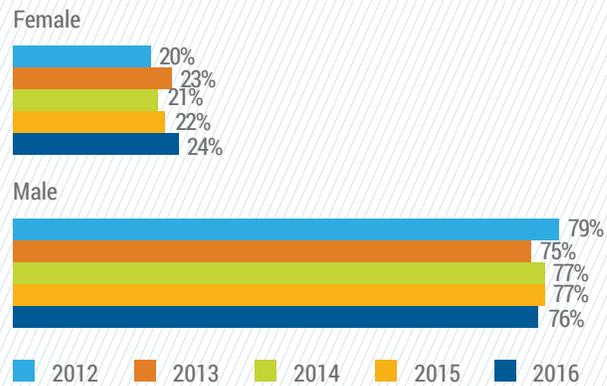
Consistently over the past five years, CIOs reported their management scope included traditional core responsibilities for supporting administrative and academic applications, programming applications, helpdesk, networking, and telecommunications. This year's survey has shown a decline in library management responsibilities from last year. The percentage of CIOs responsible for research computing has increased, and institutional research responsibilities continue to stay the same. CIO responsibility for media services, including video supervision, has held steady at 67 percent, the same as last year.

CIO Characteristics

The characteristics of today's higher education CIO as typically being a mature male have not changed dramatically over the last five years. Forty-four percent of CIOs are 55 years of age or older. Forty-one percent of CIOs are between the ages of 45 and 55. Only 14 percent were between 36 and 45 and 2 percent younger than 35 years old. Males dominate the field with an average of 76 percent for all institution types, down from 79 percent in

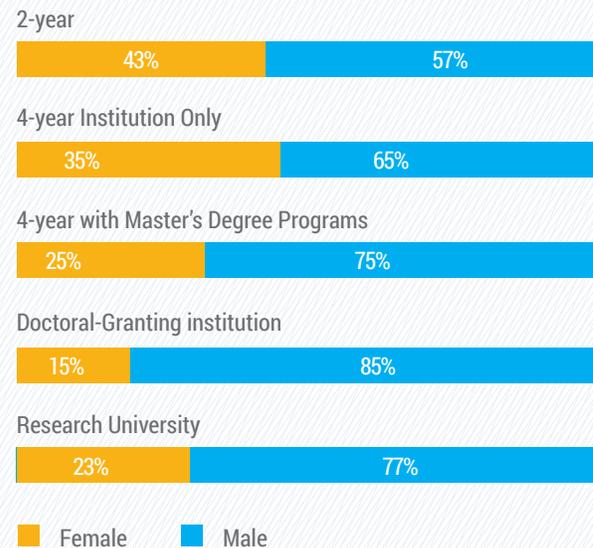
2012, but major differences exist across the spectrum of institutions. The percent of female CIOs is highest—43 percent—at two-year institutions and lowest—5 percent—at four-year with doctoral degree institutions.

Changes to CIO Characteristics by Gender



Various combinations of education, experience in the role, and knowledge influence CIO professional advancement opportunities. Eighty-seven percent of CIOs hold a master's or higher degree, with 23 percent having earned a doctorate. The lowest degree held by CIOs is a bachelor's degree, according to this year's survey, with 14 percent holding only an undergraduate degree. The last five years of the survey demonstrated fairly consistent data in this category.

CIO Characteristics by Gender

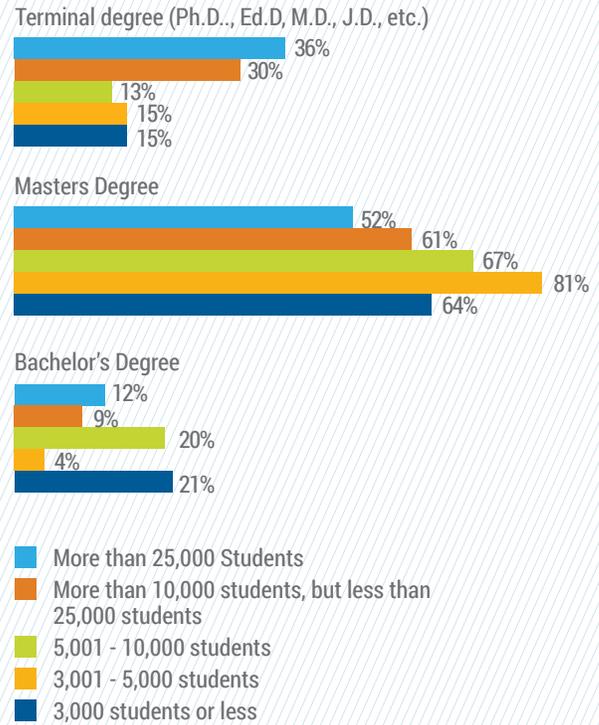


New to this year's survey are questions about the types of activities that are important for CIO professional development. Peer relationships and professional associations are listed first and second in importance with visits to other institutions/organizations listed third.

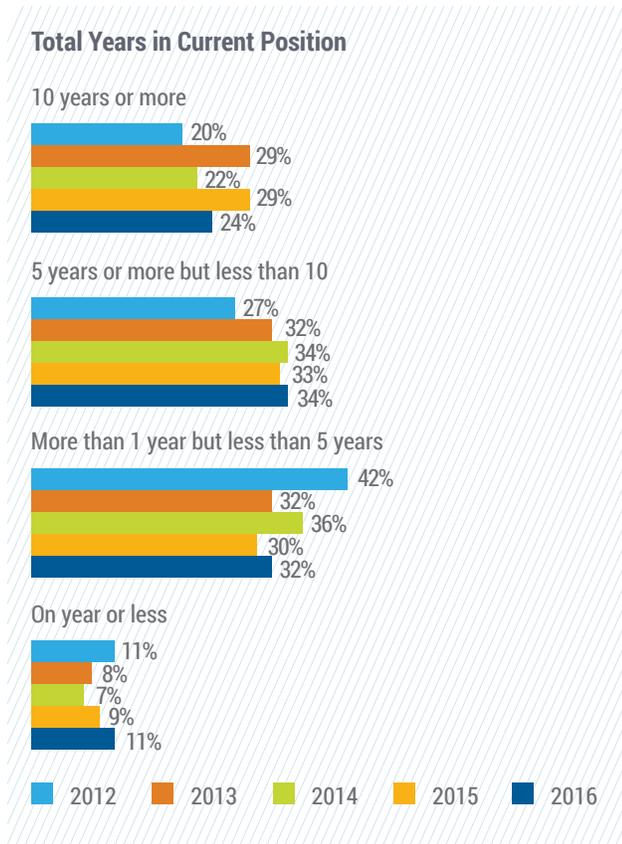


The size of the institution is important regarding the CIO's having a terminal degree. At institutions with more than 25,000 students, 36 percent of the CIOs had a terminal degree, compared with only 15 percent holding a terminal degree at institutions with 3,001-5,000 students. Sixty-six percent of CIOs at institutions having more than 10,000 students have 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 masters, 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 to only 75 percent of CIOs at four-year institutions.

Highest Degree Attainment of CIO



Change in IT leadership seems to be hitting many institutions as 24 percent of CIOs have been in their role for 10 years or more (down from 29 percent last year) while 43 percent have been in their current role 5 years or less (up from 39 percent last year). In small institutions with 3,001-5,000 students, 50 percent of the CIOs have been in that role 15 years or longer, compared with 29 percent overall, and 71 percent overall have been in their current role less than 10 years. In the next few years, there could be an opportunity for job mobility for younger potential CIOs as increased numbers of retirements in higher education at the CIO level are expected to continue to occur.



Higher Education CIO Succession Planning

CIO succession planning continues to be important for many CIOs, with 41 percent considering it a high priority and another 48 percent considering it a moderate priority. Overall, Senior leadership continues to recognize the importance of succession planning with 58 percent indicating that succession planning for senior administrative roles is either a high priority or moderate priority. This indicates that while senior administrators consider this important, CIOs rate it even more important.

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-seven percent prioritized management and leadership acumen as the reason they chose a person. Other important traits included interpersonal abilities, collaboration and political skill, and intelligence and ability to learn. Technical skills were important for only 55 percent of those responding. Thirty-five percent of CIOs had not identified at least one person they would like to mentor to replace them as CIO. Essential building blocks of the mentoring process include; opportunities to lead key projects and processes with guidance as needed (90 percent), followed by the exposure of the mentee to high levels of collaboration and knowledge transfer (87 percent). Exposure of the mentee to senior administrative discussion was important to 81 percent, and a shared leadership/decision-making model came in at 75 percent. Shared scholarly activities (papers, presentations, conferences) were the least crucial at 22 percent.

As in the last three years, even with CIO efforts to train and prepare the institution's next CIO, 39 percent responded that their institutions would recruit externally whether or not a succession plan was in place, and only 10 percent sensed their institutions would promote from within, even with a succession plan in place. There seems to be a disconnect between succession planning and hiring on many campuses.

Opinions on How the CIO Will Be Replaced

Promote from within knowing that a succession plan is in place



Promote from within, with no succession plan in place



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



It could go either way, depending on circumstances and/or executive leadership at the time

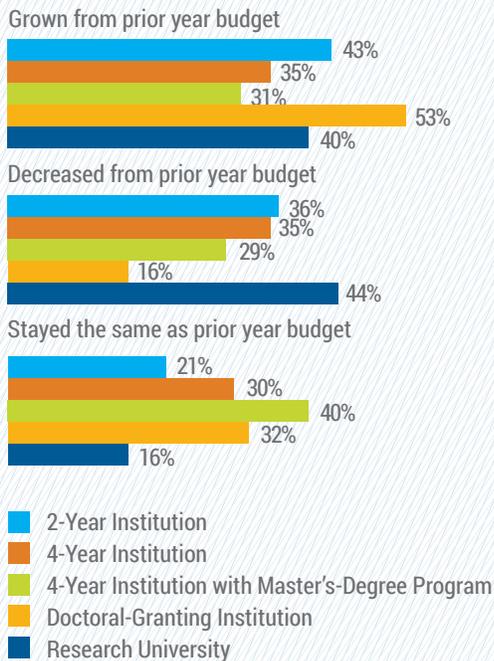


2013 2014 2015 2016

FINANCIAL AND BUDGET PLANNING

For the sixth consecutive year, more respondents stated that total institutional operating budgets have “Grown from the prior year budget” (40 percent) than decreased or stayed the same. However, this was a dramatic drop from last year’s 48 percent. Also, the percent of institutions reporting decreased institutional operating budgets rose to 31 percent this year from 24 percent last year. Generally, the changes from 2015 to 2016 indicate that many institutions are dealing with the unpleasant dilemma of either flat (29 percent) or decreased funding (31 percent) at the institutional level. Doctoral-granting institutions seem to be doing better than other classifications.

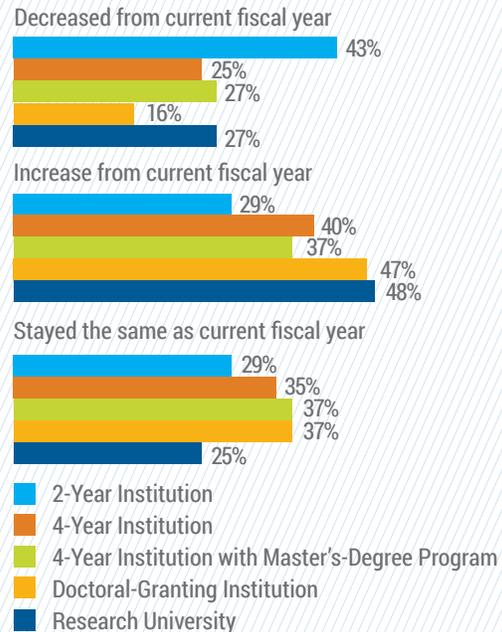
Changes in Institutional Budgets from Fiscal Year 2014-2015 to Fiscal Year 2015-2016



When asked about next year’s institutional budget, 43 percent of CIOs anticipated growth, 32 percent expected budgets to stay the same, and 25 percent projected a smaller operating budget for their institution. The percent of anticipated increases in institutional budgets (43 percent) is the lowest of the most recent four years (2015 was 46 percent, 2014 was 47 percent, 2013 was 46 percent). The percent of anticipated decreases in institutional budgets (25 percent) is the highest of the most recent four years (2015 was 21 percent, 2014 was 22 percent, 2013 was 18 percent). These two metrics would indicate that, overall, average institutional funding is anticipated to move downward, or at best, stay the same.

When it comes to the prospect of budget growth, the type of institution does matter. Doctoral institutions anticipate the greatest number of institutions with increases in budgets (48 percent). Doctoral institutions are not far behind, with 47 percent expecting institutional budget growth. Forty-three percent of two-year institutions anticipate a budget decrease. Interestingly, 29 percent of two-year institutions expect an increase in their budgets.

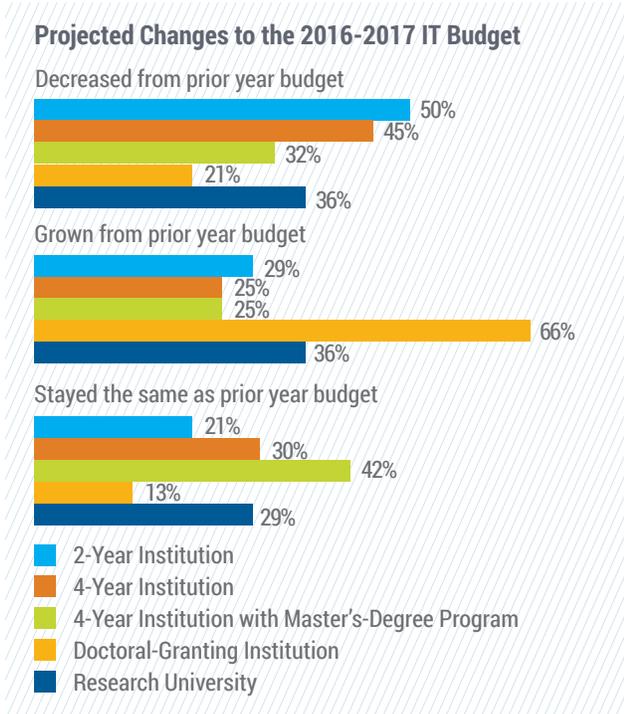
Projected Changes to the 2016-2017 Fiscal Budget



Budgets for Information Technology

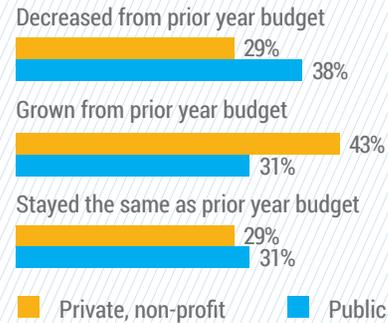
Slightly more CIOs saw their IT budget for Fiscal Year 2015-2016 increasing (38 percent), rather than staying the same (29 percent) or decreasing (33 percent). However, 43 percent expect their IT budget to increase while 33 percent expect it to stay the same and 24 percent expect it to decrease. These numbers correspond to expectations for the overall institutional budget as detailed previously

When looking at the IT budgets by institutional type, doctoral institutions experienced the greatest growth in from the prior year (66 percent) while four-year institutions with or without master's degrees experienced the least growth (25 percent).



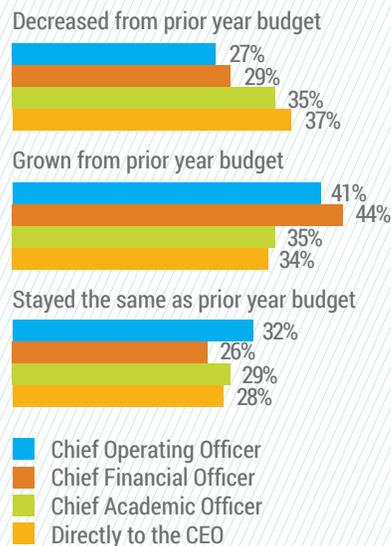
When examining public versus private sector institutions, there is a noticeable difference in IT funding increases and decreases. Private institutions increased IT funding dramatically (43 percent) when compared to public institutions (31 percent). Similarly, only 29 percent of private institutions saw a decrease in IT funding, while 38 percent of public institutions decreased IT spending. This may indicate that private institutions are attempting to close a gap of deferred expenses in order to compete with publics, or possibly that privates are attempting to offer better IT-based services to their students and faculty than publics.

Changes to IT Budget for Current Fiscal Year



When reviewing this year's IT budget increases against last year's figures, and analyzing where the Chief Information Officer reports in the institutional organization, it appears that increased funding this year accrued most often to those CIOs reporting to Chief Financial officers (44 percent) or Chief Operating Officers (41 percent). This is compared to 35 percent reporting increases for CIOs reporting to the Chief Academic Officers and 34 percent reporting to the Chief Executive Officers. Information not collected in this survey that, when coupled with reporting structure, could explain these observations. As an example, how long the institutions have been in their organizational arrangement regarding IT reporting structure and what funding may have been provided in the previous years to this survey could be factors. Further study may be warranted on this in future years.

Changes in IT Budget Based on CIO Reporting Structure



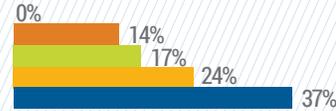
Technology Fees

The practice of charging fees to help cover direct IT expenses was applied slightly more frequently to technology this year. In 2016, 47 percent of institutions charged a single, omnibus technology fee, up 1 percent from 2015 (46 percent) but less than reported in 2014 (51 percent). Those institutions charging a tech fee either charge a single fee (47 percent) or tie it to specific courses or programs (5 percent), while 48 percent do not charge a fee. Increased demands for accountability for both tuition and fee increases by governing boards may be slowing the growth of special mandatory fees like technology fees.

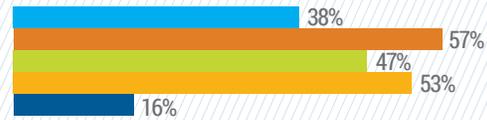
The money collected from student technology fees doesn't necessarily make its way into the IT budget. Only 32 percent of institutions reported that student fees went into the IT budget, down 5 percent from 37 percent in 2015 and down from 42 percent in both 2014 and 2013. Most of the time these funds went into the general fund (40 percent) the same as 2015 (40 percent). For other institutions, tech fees were split between the general fund and the IT budget (22 percent) or went into a specific course or department budget (10 percent). The allocation to departments outside IT doubled from that reported last year (5 percent). We will follow this issue next year to determine if this is purely a course support issue or a move to decentralize IT spending.

How Student Tech Fees are Used

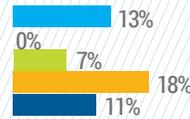
Some of tech fees go into IT and rest into general fund



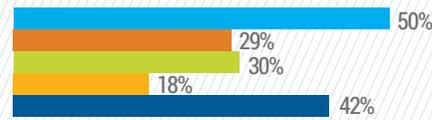
Tech fees go into general fund



Tech fees go into course or department budget



Tech fees go directly into IT budget

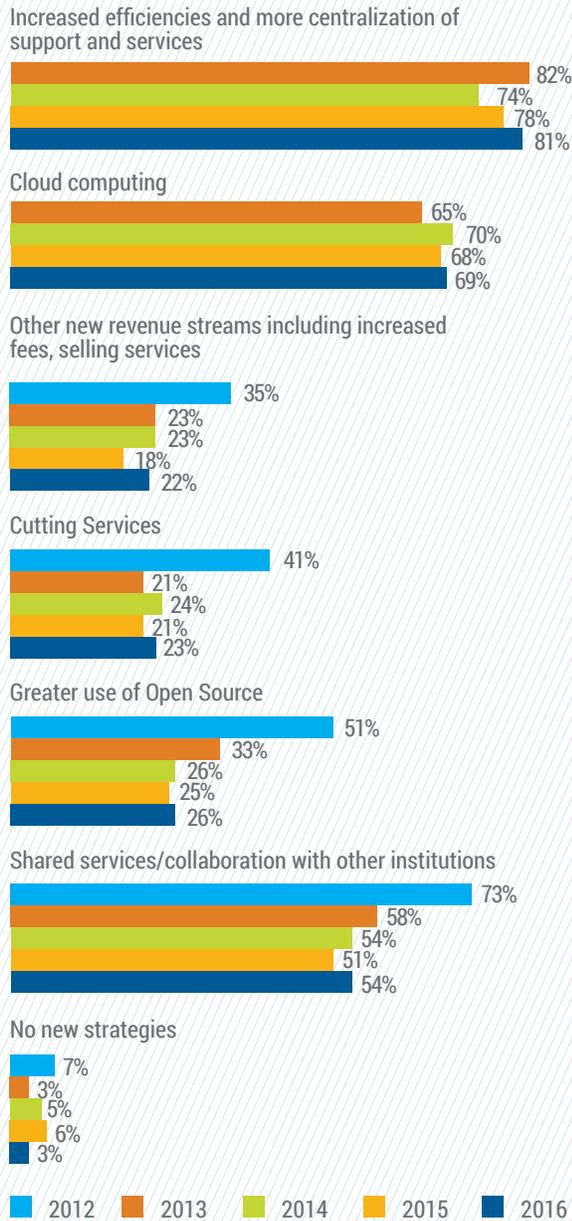


- 2-Year-Institution
- 4-Year-Institution
- 4-Year with Master's Degree Programs
- Doctoral-Granting Institution
- Research University

Stretching IT Funding

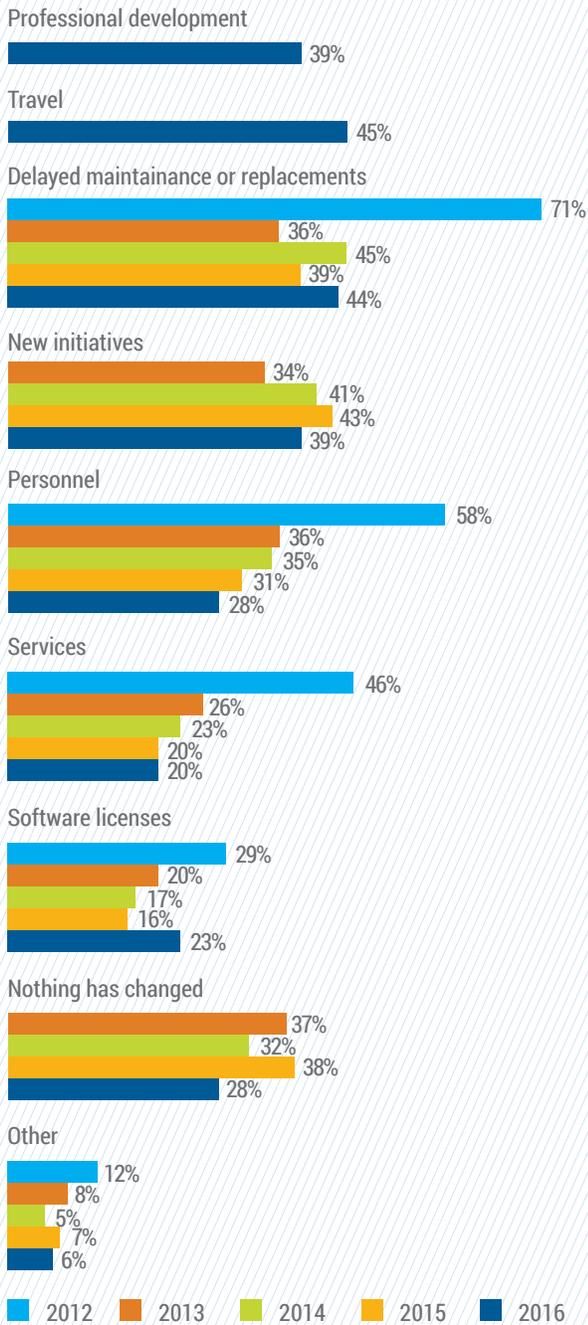
With only 43 percent of CIOs anticipating an increase in their IT budgets next fiscal year and with an increased demand for services, stretching available funding continues to be a challenge. Expected increases in institutional operating budgets are, for the first time, the same as expected IT budget increases: 43 percent. The top response from CIOs regarding how they expect to meet the funding challenge for 2016/2017 was through increased efficiencies and more centralization of support and services (81 percent), followed by more use of cloud computing (69 percent), shared services/collaboration with other institutions (54 percent), and greater use of open source (26 percent). Cutting services (23 percent) and finding new revenue sources (22 percent) followed. It is difficult for CIOs to find new money, but some are finding additional funding through selling of IT services and support to other organizations or through the use of shared services with other institutions.

Strategies Being Considered to Stretch IT Funding

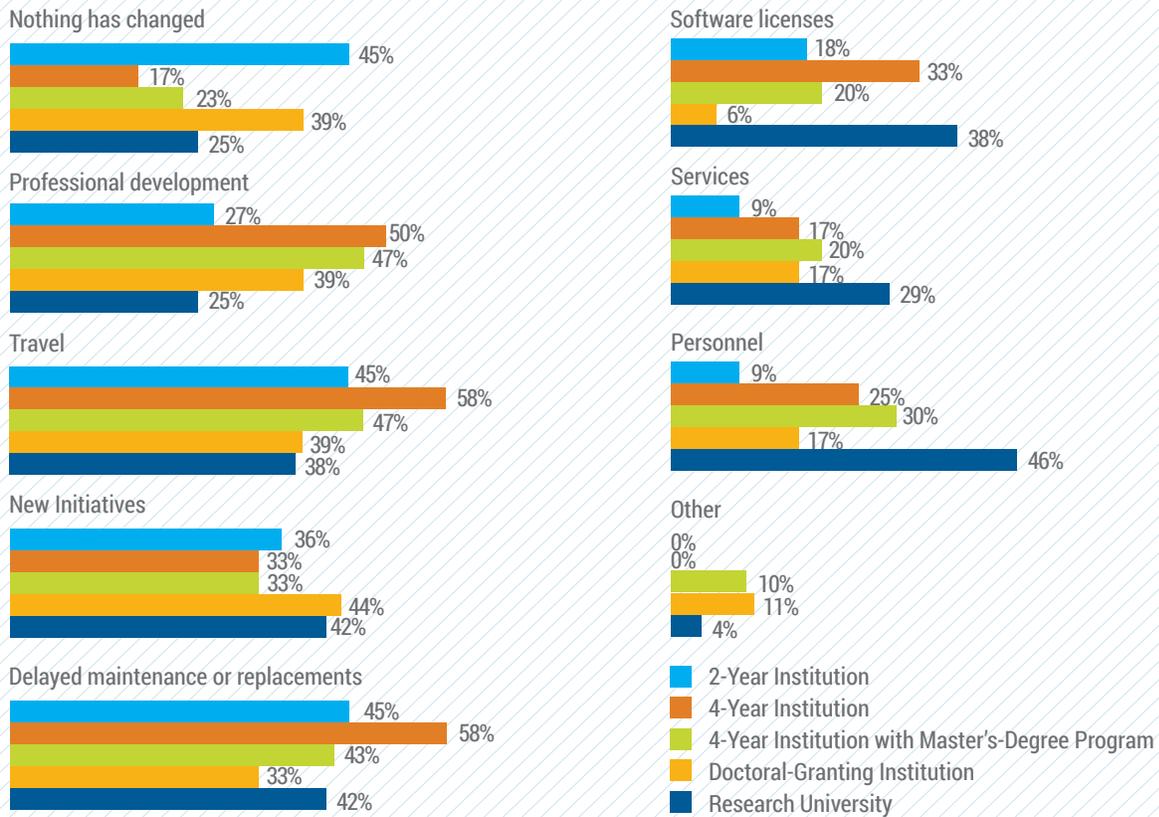


For those who had to cut their IT budget, the most frequently selected cuts were in reducing travel (45 percent, data not collected last year), delayed maintenance or replacements (44 percent, up from 39 percent last year), deferred professional development (39 percent, not collected last year), and new initiatives (39 percent, down from 43 percent). Cuts in personnel (28 percent, down from 31 percent) and reduction in services secured by IT (28 percent, dramatically down from 38 percent) were less popular strategies to address IT budgetary reductions.

Cuts to the IT Budget from Previous Year



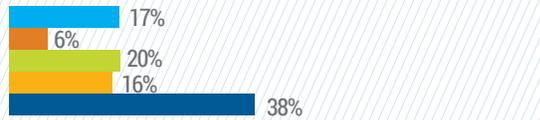
Cuts to the IT Budget, by Institution Type



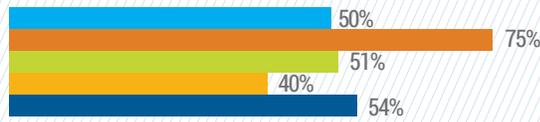
For CIOs planning for no growth or cuts to their IT budgets next fiscal year, renegotiating contracts (68 percent, up from 56 percent), cutbacks in services and support (53 percent, up from 44 percent), non-replacement of staff (39 percent, up from 46 percent), staff position eliminations (21 percent, dramatically up from 15 percent) and increased use of chargebacks (19 percent, up from 17 percent) were the top choices. Four-year institutions were less likely to renegotiate contracts with vendors and more likely to cut back on services and support, while two-year and research universities were less likely to replace personnel.

Strategies Used to Manage Budget Reductions or Stagnation

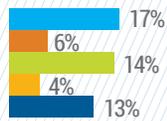
Staff positions eliminations



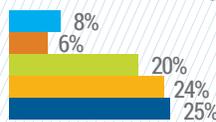
Cutbacks in services and support



Increased student fees



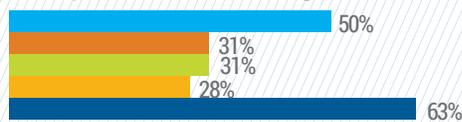
Increased use of chargebacks for services/support



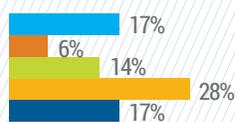
Renegotiating contracts with vendors



Non-replacement of staff leaving the institution



Other



- 2-Year Institution
- 4-Year Institution
- 4-Year Institution with Master's-Degree Program
- Doctoral-Granting Institution
- Research University

Institutions who stated that their IT Strategic Plans played an integral part of their institution's budget development process were more likely to have IT reporting to the Chief Executive Officer (72 percent) or the Chief Operating Officer (68 percent). Institutions stating that their IT Strategic Plan was not incorporated into the institutional budget process were most likely reporting to the Chief Fiscal Officer (38 percent), or the Chief Academic Officer (35 percent).

Incorporation of IT Strategic Plan in Budgeting Process, by CIO Reporting Structure

Yes



No



- Chief Operating Officer
- Chief Financial Officer
- Chief Academic Officer
- Directly to the CEO

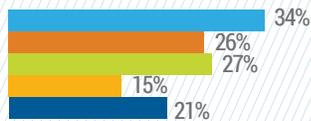
IT ORGANIZATION AND GOVERNANCE

Staffing

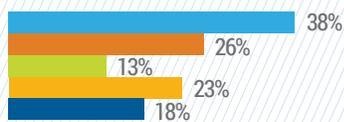
The majority of survey respondents reported IT staffing levels for full time employees have remained the same this year (51 percent). No growth is the common expectation for most institutions. However, institutions with more than 25,000 students showed the greatest fluctuation, with only 28 percent reporting that staffing levels stayed the same, while 38 percent reported decreases and 34 percent reported increases.

Changes to the Size of the IT Staff

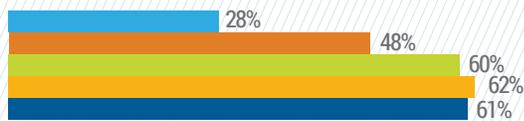
Increase in the past 12 months



Decrease in the past 12 months



Stayed the same

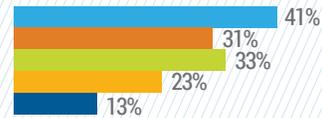


- More than 25,000 Students
- More than 10,000 students, but less than 25,000 students
- 5,001 - 10,000 students
- 3,001 - 5,000 students
- 3,000 students or less

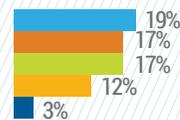
A majority of institutions are expecting their staffing levels to stay the same next year (58 percent) but fluctuations are more pronounced by size as 84 percent of institutions with less than 3,000 students expect staffing levels to stay the same compared to 41 percent of institutions with more than 25,000 students.

Projections for Changes to the Size of the IT Staff

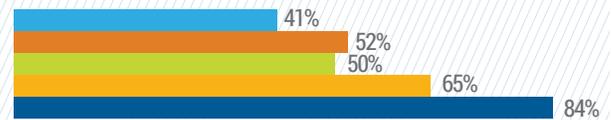
Increase in next year



Decrease in the next year

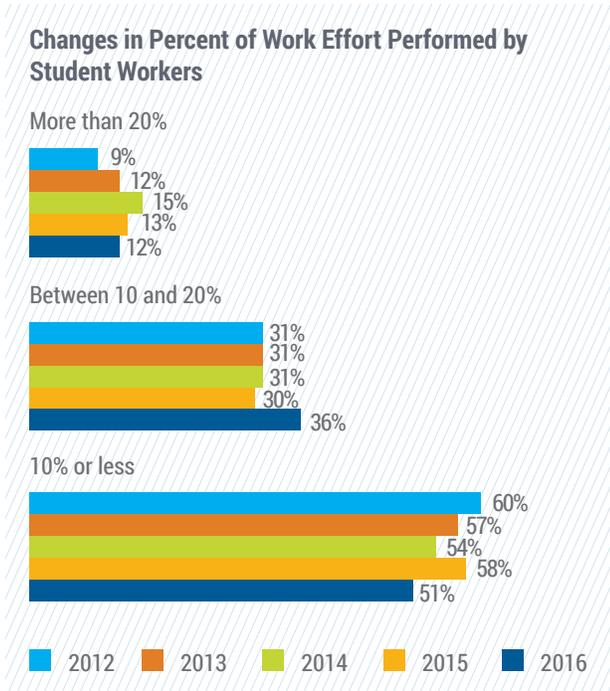


Stay the same



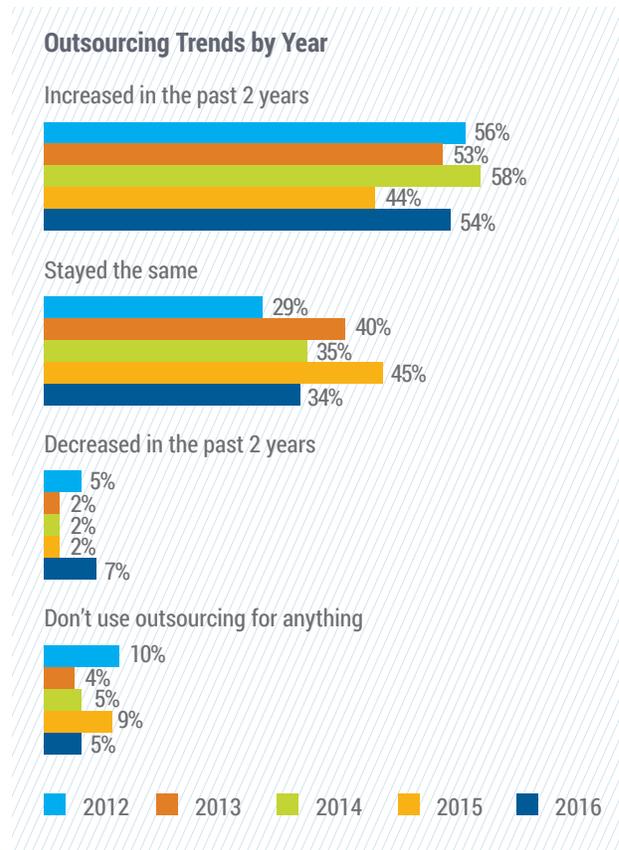
- More than 25,000 Students
- More than 10,000 students, but less than 25,000 students
- 5,001 - 10,000 students
- 3,001 - 5,000 students
- 3,000 students or less

The use of student workers in IT (as a percentage of IT staffing) has increased this past year: Thirty-six percent of respondents reported that students make up 10–20 percent of their total IT work effort. Providing real-world work experience to students, increase in focus on STEM majors at higher education institutions, or hiring freezes for full-time staff may be contributors to this increase. Sixty-seven percent of respondents expect the use of student workers to remain the same in the next year.



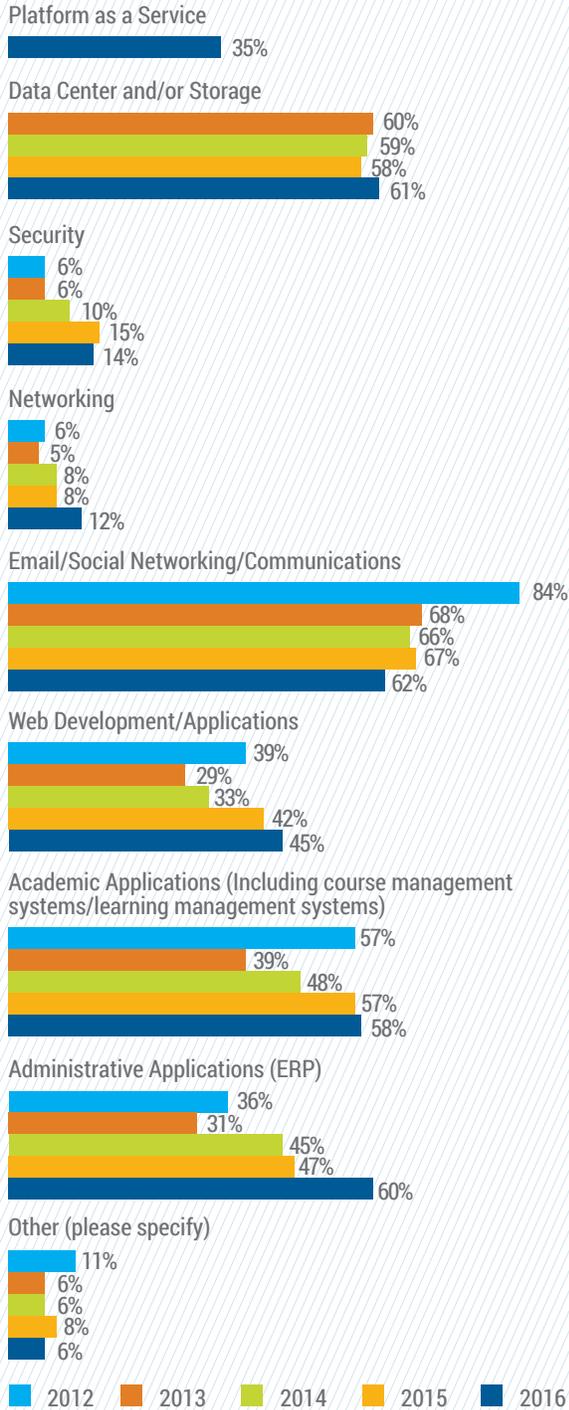
Outsourcing

More than half of the survey respondents (54 percent) reported that the use of outsourcing for IT services has increased in the past two years. This is consistent with survey responses received in past years except for a drop in 2015.



Email continues to be the most popular outsourced service/system (67 percent) with course management systems coming in as a close second (60 percent). Consideration for moving administrative applications (ERP) to the Cloud was at its highest interest since the beginning of this survey. Sixty percent of respondents are considering moving their ERP to the Cloud. This year we added the option of "Platform as a Service," (PaaS) which was selected by 35 percent of institutions.

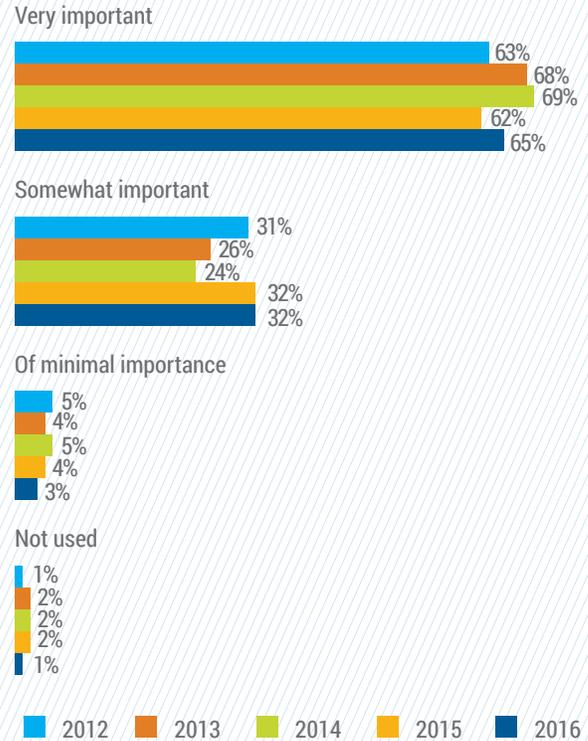
Projections on Future Use of Cloud Computing and Outsourcing



IT Governance

Most CIOs continue to view IT governance as very important within their institutions (65 percent).

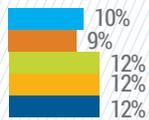
Importance of IT Governance



Many CIOs use IT governance in an advisory role rather than as a decision-making body. Only 12 percent of respondents rely completely upon the IT governance model to make decisions; however 55 percent chose “relatively high reliance but the ultimate decision is mine.”

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

Rely completely upon the IT governance model to make decisions



Relatively high reliance but ultimate decision is mine



Low reliance upon IT governance model to make decisions is mine



Do not rely at all upon IT governance

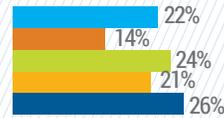


2012 2013 2014 2015 2016

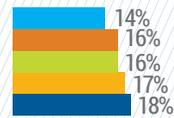
It appears that the executive level of the institution is becoming more involved in IT decisions, as 26 percent report that the Board of Trustees/Directors/Governors/Other is included in their IT Governance model, compared to 21 percent in the 2015 survey.

Composition of IT Governance

Board of Trustees/Directors/Governors/Other



Outside influencers (advisory board)



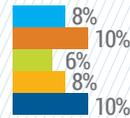
High level committee(s) to set priorities for IT



User group(s)



Other



2012 2013 2014 2015 2016

CONSUMERIZATION OF IT

It might seem strange that consumerization of IT remains a significant section within the LBCIO survey, given the long history of higher education dealing with consumerization. Students have been bringing their own technology to campus for decades. One way to illustrate the continuing importance of consumerization of IT is to imagine institutions of higher education using tag lines like these:

- “A place where technology is subordinated to human needs.”
- “Emphasizing human interaction rather than technology immersion.”
- “An outstanding educational environment with invisible technology.”

These tag lines communicate a praiseworthy focus on human needs but would be anachronistic for today’s students and communicate a Luddite spirit. Consider the message that would be conveyed by reversing the statements:

- “A place where human needs are subordinated to technology.”
- “Emphasizing technology immersion over human interaction.”
- “An outstanding educational environment with conspicuous technology.”

The revised statements would demonstrate full support for the consumerization of IT, but perhaps at the expense of fundamental educational mission. Where, then, is the balance between technology and mission?

Ninety-five percent of the CIO survey respondents indicated that consumerization of IT is having a moderate (49 percent) or significant (46 percent) impact on their campus. The combination of these two figures (95 percent) is consistent with results over the last five years. It is interesting that 66 percent of CIOs from midsize institutions (10,000-25,000 students) put the impact at the “significant” level, compared to about 40 percent of other CIOs who listed the impact of consumerization as “significant.”

The 2016 survey is the first year in which there is a year-over-year comparison with how CIOs feel they are handling consumerization. In 2015, 37 percent of the CIOs indicated that consumerization is getting better and is easier to deal with. That percentage increased to 42

percent in the 2016 survey. The percentage of CIOs who indicated that consumerization is getting worse and more difficult to deal with stayed relatively constant (24 percent in 2015 and 25 percent in 2016).

CIOs were asked to rank six potential benefits from consumerization. “Freedom of choice” was still ranked high (69 percent), although lower than prior years (77 percent-80 percent). There was a dramatic drop in CIOs’ perception of competitive advantage. Only 32 percent thought that consumerization of IT could give their institutions a competitive advantage. This ranking had been in the 50 percent range for several years. The “competitive advantage” ranking took a significant hit from those CIOs who report to CFOs: only 9 percent reported a competitive advantage. Could it be that a focus on financial considerations lessens the advantage of using information technology to achieve institutional distinctiveness?

The benefit evaluation included one new item this year: “exploration of new technologies.” Seventy-two percent of CIOs reported that consumerization of IT provided this benefit. This ranking was consistent across CIOs, independent of reporting relationship.

When asked about potential problems with the consumerization of IT, 90 percent of CIOs selected “greater security issues.” This is consistent with the last five years of data. The problem that had the second highest mention was “integration,” with existing systems at 72 percent. Third on the problem list was the need for additional bandwidth (64 percent of CIOs). This bandwidth ranking reflects an ongoing concern by the CIOs, but at a slightly lower level than previously (70 percent-76 percent).

How problems were ranked appears to be influenced by budget pressures. Fifty-four percent of CIOs who had experienced a recent budget reduction indicated a need for more staff to support the consumerization of IT. Only 37 percent of CIOs who had experienced a recent budget increase identified staffing as a problem. Perhaps institutions with recent budget reductions are facing staffing pressures in multiple areas, not just with consumerization.

ADMINISTRATIVE COMPUTING PLANS

CIOs have been quite consistent in evaluating training needs associated with the consumerization of IT. Sixty-three percent indicated more professional development was needed for current staff and 33 percent indicated a need to hire new people with different skills. These percentages reflect little change from prior survey results.

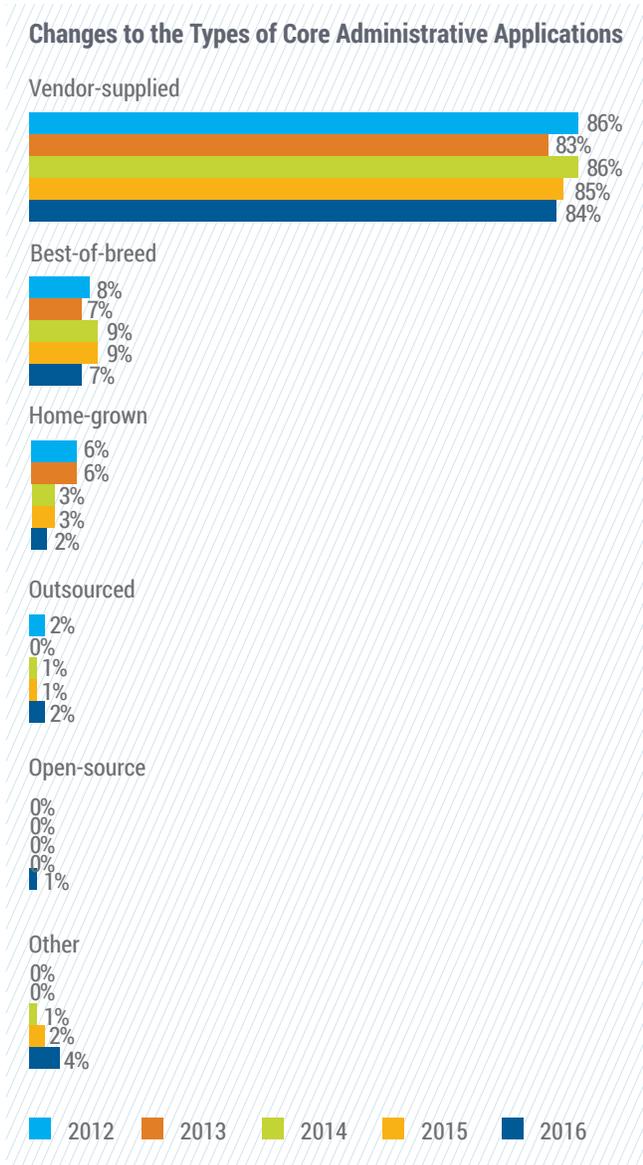
Today's students are skilled at using mobile devices and other consumer technologies for various aspects of their personal lives. CIOs need to make sure that the transition from personal use to educational use is robust and frictionless and support issues are clearly defined.

Higher education CIOs continue to make a significant investment in their institutions' administrative and ERP systems. This year's survey results continue to show that vendor-supplied solutions, primarily on-premise offerings, dominate this investment. Best-of-breed (which typically include vendor solutions), outsourced, open-source and in-house developed solutions make up a much smaller percentage of systems. The results also suggest increased interest and efforts to move administrative computing to a hosted cloud environment.

While there is much on-going discussion within higher education in moving administrative computing solutions 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, based on this year's survey results. There was a small up-tick in out-sourced solutions; however there was also a noted increase in those who have plans to replace their systems within the next several years.

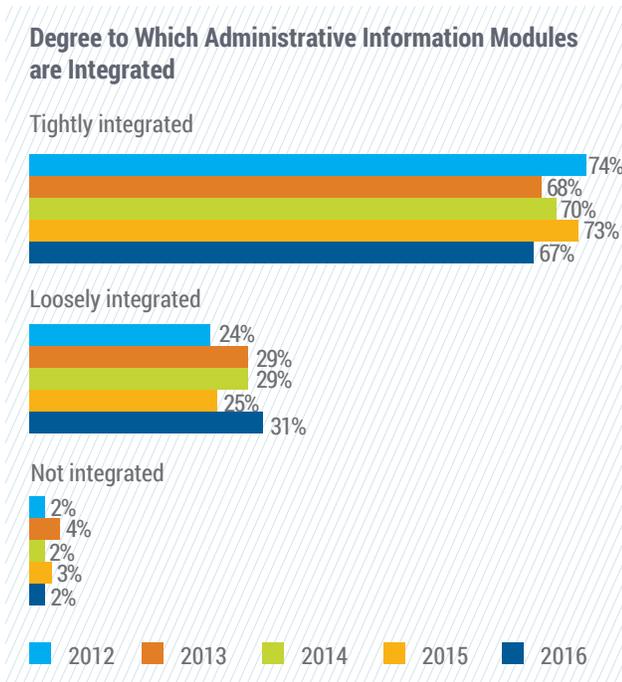
Enterprise Resource Planning (ERP)

Again this year, as well as consistently over the past six years of the survey, 84 percent of all core administrative and ERP systems are vendor based. Very little change occurred in the utilization of open-source, out-sourced, or best-of-breed solutions this year, with this total remaining at 16 percent. A consistent downtrend of homegrown developed solutions has continued, emphasizing the importance of highly integrated processes as key to running and growing the business of higher education.



The 2016 survey results which best describe core administrative systems were basically the same as 2015, with 93 percent using vendor-supplied financial systems, 88 percent using vendor-supplied student systems, 88 percent using vendor-supplied human resource systems and 93 percent using vendor-supplied advancement systems (up from 90 percent in 2015). No change occurred in the use of homegrown financial systems and homegrown human resource systems, and there was a small increase to 11 percent using homegrown student systems up from 8 percent in 2015.

Financial, payroll, advancement, grants management, and student services, including financial aid, registration, and grading are common uses of vendor solutions across all institution sizes, both public and private. Tightly integrated modules continue to be important and represent two-thirds of the administrative modules, while loosely coupled modules represent less than a third of the responses.



In-house or Outsourced

The core administrative applications (financials, student systems, human resources, advancement) for the majority of institutions are still hosted in-house and vendor supplied. A small number of institutions outsource their administrative applications. Only 2 percent of those who responded to the survey indicated that they outsource core administrative systems. Institutions using open-source for their administrative applications are up slightly from last year. This slight increase may be attributed to the trend of institutions adopting hosted CRM systems (Customer Relationship Management), which are used for recruiting and enrollment of students, email, and learning-management systems.

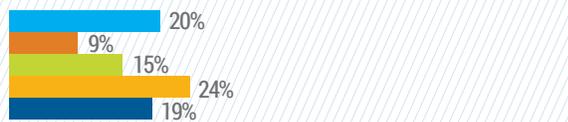
While cloud options may offer a number of benefits, the move to the Cloud has been slower than some anticipated based on past survey results. Most offerings from vendors of administrative applications are improving as technology advances and experience in the Cloud with academic and social networking activities continue to grow. However, concerns with having administrative data hosted away from campus are still prevalent on many campuses. These concerns include the risk of data loss, security breaches, as well as cost and access of data. Some institutions are bound by national laws that do not allow administrative and personal data to be stored outside their nation. That can pose a problem for higher education cloud activities in those countries.

Integration

Another concern with the use of the Cloud for administrative systems is integration of data and the expertise required to implement and maintain the integration. Tight integration of administrative applications or modules is high on the list of importance for the majority of CIOs and their institutions. Most respondents indicated that their administrative systems were tightly integrated. With more and more institutions planning to move to the Cloud, integration of data will be more crucial than ever. Choosing the right out-sourced or open source applications that integrate seamlessly with the ERP is very important. Yet, the percentage of tightly integrated systems decreased from last year. This may be an indication of challenges that come with the shift to the Cloud and integrating different systems and technologies.

Use of the Cloud for Administration Applications

Student applications (enrollment management, registration...)



Financial applications



2012 2013 2014 2015 2016

resource system, 28 percent will upgrade or replace their payroll system, and 32 percent will upgrade or replace their advancement systems. These replacements and upgrades will require extensive planning, business process reengineering, and project management skills and effort. Many institutions faced with tight budgets over the past five years are now replacing or upgrading systems. As with deferred maintenance on buildings, there comes a time when postponed work must be done to maintain the integrity of the buildings or, in this instance, information systems. We will also need to monitor changing enrollments to determine the impact on these systems.

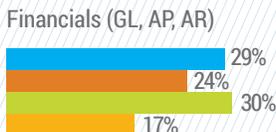
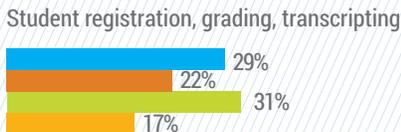
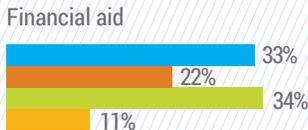
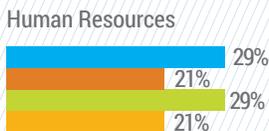
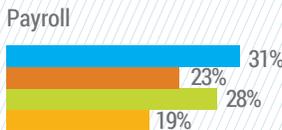
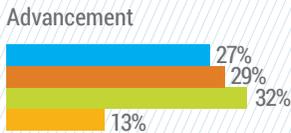
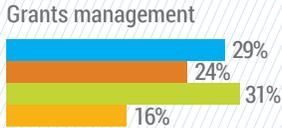
Upgrade Planning

Administrative systems take considerable money, time, and effort to implement and maintain, but no university can exist without them. Once these systems are in place, institutions often do not have the resources to replace them for many years. While in some businesses and industries replacement cycles are much less than ten years, in higher education the cycles can be more than twenty years.

Plans to replace or upgrade administrative systems in the future have been increasing steadily over the years. The trend appears to be that institutions are replacing components or modules of their administrative applications rather than all of their administrative systems at once. Seventeen percent of institutions are currently replacing or upgrading student systems, up from 3 percent from last year. Twenty-one percent are replacing or upgrading human resource systems, and 12 percent are replacing or upgrading advancement systems, up 1 percent from last year in both cases. Nineteen percent are replacing or upgrading payroll systems, increasing by 2 percent from last year. Institutions currently replacing or upgrading financial systems decreased 3 percent from last year, which may indicate completion of projects.

According to this year's responses, in two to three years 30 percent will replace or upgrade their financial systems, 31 percent will replace or upgrade their student system, 29 percent will upgrade or replace their human

Timeline for Upgrading or Replacing Administrative Systems

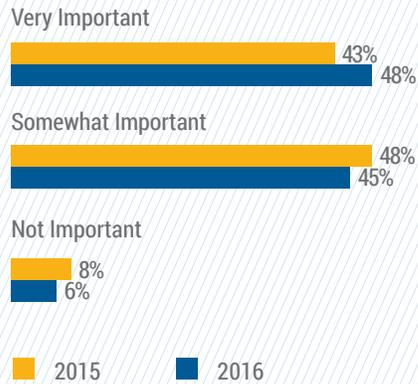


- More than 6 years
- 4-6 years
- Next 2-3 years
- In process

Business Process Improvement

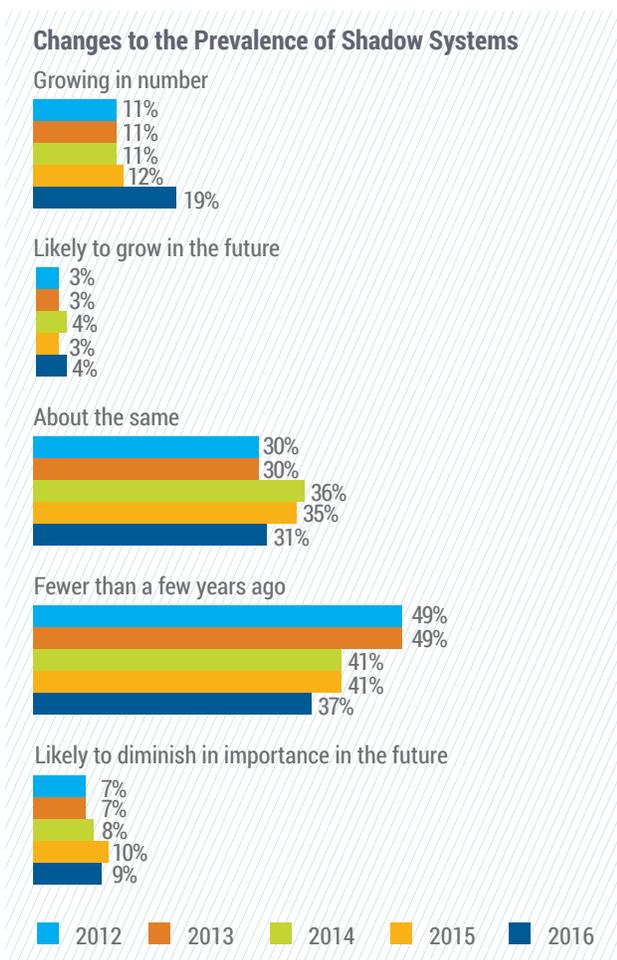
As cloud and hosted solution vendors build a customer base in the coming years, higher education institutions will need to reduce customizations and modifications of their systems, as well as review, align, and more readily adopt standard business practices and processes with those offered by cloud vendors. This trend may be reflected in the survey results, which show an increase of 5 percent in the importance of business process reengineering (BPR) and improvement over last year. Regardless of on-premise or cloud administrative computing decisions in the future, administrative computing and ERP systems continue to represent a large, major investment of overall IT budgets and provide mission-critical support to key business processes throughout higher education.

Changes to the Importance of Business Process Reengineering



Efforts in business process reengineering help in revealing the existence of shadow systems in an institution. The existence of shadow systems often reflects a gap between the requirements of the academic or business units and the solutions ERPs and administrative applications offer. The majority of respondents continue to discourage shadow systems at their institutions. Many of the institutions (37 percent) indicate that shadow systems are less prevalent than a few years ago, while 9 percent indicate they are likely to diminish in importance in the future. Nineteen percent indicate they are growing in number, and only 4 percent indicate they are likely to grow in the future.

In summary, the survey results confirm that ERPs and core administrative systems are critical to the business of higher education and in support of student-focused services, based on the continuing and planned investments by CIOs. There appears to be a continuing focus and review of these large investments to determine the appropriate path going forward, particularly in the area of ERP cloud decisions. Although cloud ERP systems continue to consume discussions and planning within higher education, a large percentage of these critical systems have remained on-premise at many institutions, a situation most likely due to the significant cost and reluctance to standardize on vendor-delivered cloud systems and business practices. However, this year's survey results suggest that there are increasing plans to replace them in the coming few years, which most likely will require detailed analysis of the advantages and disadvantages of moving this significant investment to hosted or cloud solutions.



ACADEMIC COMPUTING

CIOs and their IT organizations are increasingly challenged by the changes and advances in academic resources. As financial pressures continue to mount for most institutions, many seek ways to cut costs while improving revenue from increases in enrollments and retention. Many CIOs have predicted rapid reductions in computer labs due to cost, BYOD, remote non-campus-based student populations, and the increase in flipped classrooms. As institutions review new Course Management Systems (CMS)/ Learning Management Systems (LMS) options, many still do not have plans to make major changes in the short term. Does the type of institution impact LMS selection? While academic analytics continues to gain momentum for accessing learning outcomes, can the data from the CMS/LMS strategically be accessed and integrated with data supplied by the ERP and social networks? With the increased demand for the integration of many data sources and the demand for increases in data scientists, will the reporting and supporting of academic computing resources change? This year's survey confirmed a number of trends, as well as providing a few surprises regarding teaching and learning, including the following:

- Instability in vendor dominance in the CMS/LMS market continues, but 62 percent of the institutions reported a vendor-supplied option.
- The largest surprise was the reduction in the CMS/LMS being outsourced, down 22 percent last year to 12 percent this year. Previously outsourcing of the CMS/LMS had been trending positive (since the 2012 survey).
- Institutions selecting open-source products have fluctuated over the last six years with no real trend.
- The use of Blackboard as a standard has slipped from a high of 62 percent in 2010 to 40 percent in the 2016 survey.
- Desire2Learn is used more by two-year institutions, while four-year institutions preferred Moodle.
- The use of Canvas as a standard has increased to 21 percent from 3 percent five years ago.

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 64 percent using the same system for more than five years. It is not clear if institutions are continuing to use their existing systems while experimenting with new solutions. Twenty-five percent are considering replacing their current systems over the next two to three years.

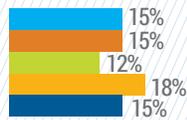
Central IT continues to provide the primary support for the CMS with 55 percent, but that number is down from 67 percent in 2011, while the number of respondents outsourcing their CMS support has risen to 22 percent from 17 percent during the same time period.

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 (43 percent), while separate units for online education have continued to decrease (11 percent). Reporting to the Office of the CIO has remained steady at 28 percent for the last two years.

Predictions that community labs would decrease seem to be slowly taking place, with 21 percent reporting a decrease this year up from 16 percent last year. Considering the increased pressure for space and a yearly maintenance cost upwards of \$500 per device, support for community labs has remained very consistent over the last six years. To whom the CIO reports may have an impact, because computer lab reductions occurred more when the CIO reported to the President/CEO or Chief Operating Officer than the CFO or CAO.

Changes to Community Labs Support and Plans

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



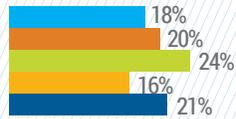
We are not increasing the number of labs, but are increasing the availability of hot sites for people



We have about the same number of community labs as we had 5 years ago



We are decreasing the number of community labs



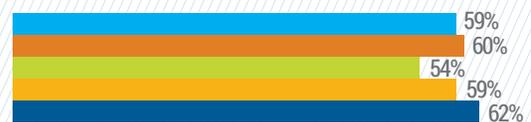
We no longer support community labs



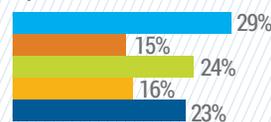
Legend: 2012 (light blue), 2013 (orange), 2014 (light green), 2015 (yellow), 2016 (dark blue)

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

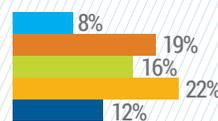
Vendor supplied



Open Source



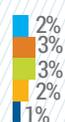
Outsourced



Homegrown



Other

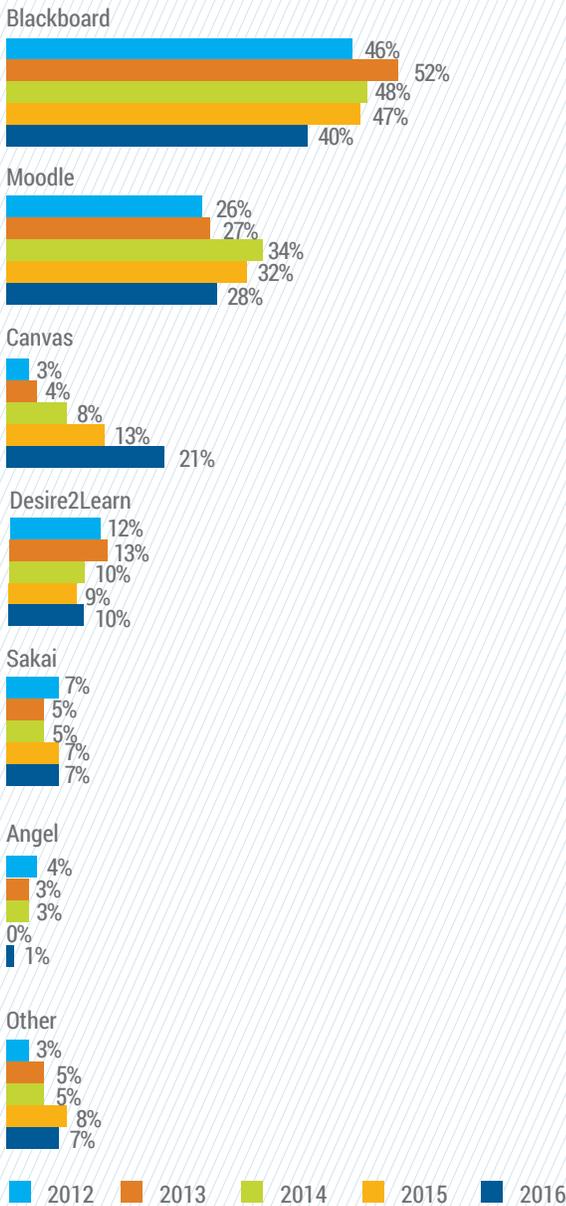


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Types of Institutional Standard CMS Systems

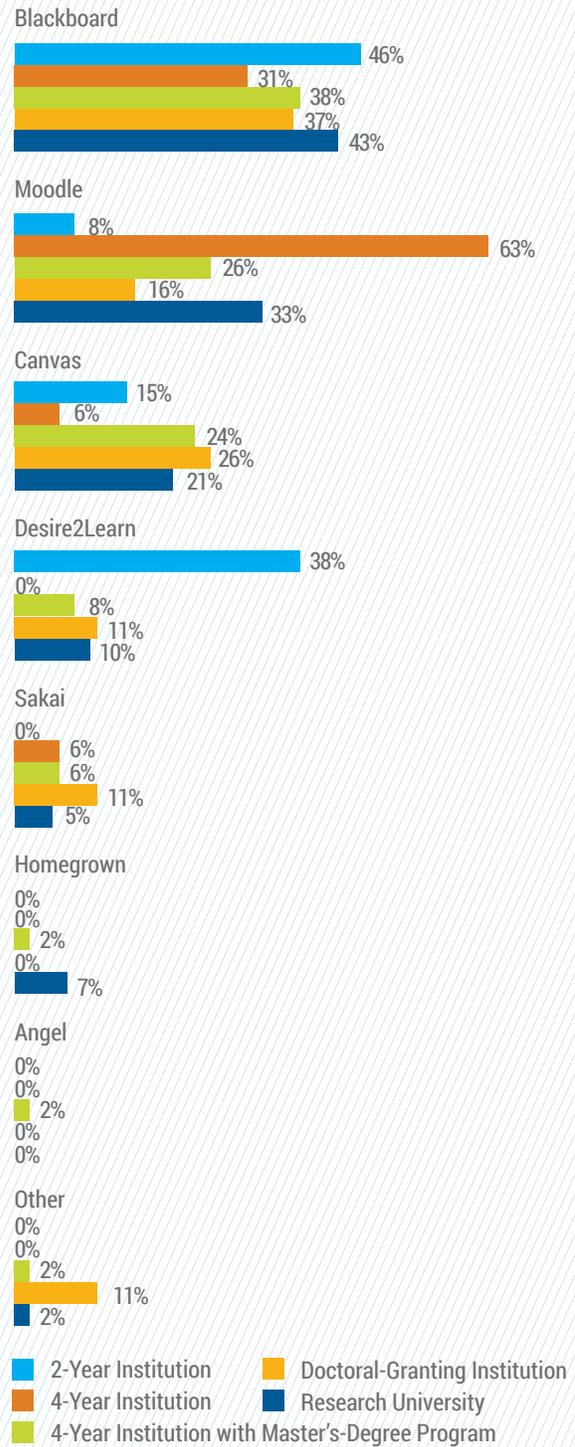
The majority of institutions (62 percent) continue to use a vendor-supplied CMS as the standard. The number of institutions using open-source solutions increased from 16 percent in 2015 to 23 percent in 2016. The trend in institutions using an outsourced solution was reversed. Outsourced CMS declined from 22 percent in 2015 to 12 percent in 2016. This decline could be an anomaly or due to increased vendor costs, poor outsource experiences, or the jump to open-source solutions.

Changes in the Use of Course/Learning Management Vendors



While Canvas adoption grew by 7 percent, Blackboard declined by 7 percent. Blackboard continues to lead as the overall institutional standard at 40 percent. Desire2Learn was popular in two-year institutions with 38 percent. Canvas was most popular in Research Universities, while Moodle was prominent in four-year institutions with 63 percent.

Use of Institution CMS/LMS Standard



Longevity and Replacement of Current CMS System

There has been little change over the past five years regarding the longevity of the CMS at institutions, with 64 percent reporting they have used the same CMS longer than five years (up from 60 percent in 2015).

Timeline for Replacing Current CMS System

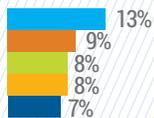
More than 5 years



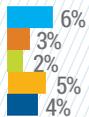
2-5 years



Less than 2 years



Currently implementing



2012 2013 2014 2015 2016

Maintaining and Managing the CMS Infrastructure for Online Learning

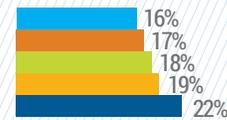
The responsibility for maintaining the CMS still overwhelmingly resides in Central IT (55 percent), but there is movement in this area. Even though outsourcing the CMS was on a decline over the last year, outsourced CMS support increased to 22 percent. Support from academic computing also increased to 9 percent from 5 percent in 2015.

Changes in Responsibility for Maintenance of CMS and Related Systems

Central IT



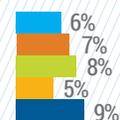
Outsourced



Separate unit for online education



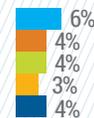
Academic computing



Shared Services



Other

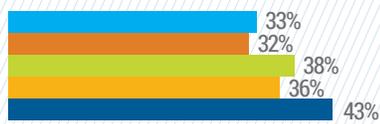


2012 2013 2014 2015 2016

Reporting functions continues to be volatile for instructional design, course design, and management of online learning. The largest change in where these functions report was in an increase to the provost/chief academic officer (43 percent in 2016 up from 36 percent last year) while the CIO remained at 28 percent.

Changes to Reporting Structure for Course Design and Online Learning

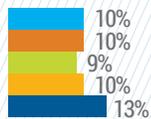
Provost or Chief Academic Officer



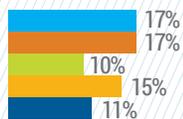
CIO



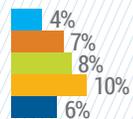
Dean level



Separate unit for online education



Other



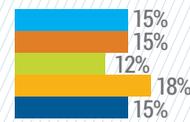
2012 2013 2014 2015 2016

Support for Community Labs

There seems to be difficulty in predicting the demand for community labs. While 21 percent will decrease the number of community labs, 15 percent will increase them, and 33 percent continue to have the same number they had five years ago.

Community Lab Support and Plans

Increase the number of labs available for general use



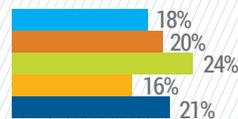
Not increasing labs, but increasing the hot sites



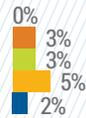
Same number of community labs as we had 5 years ago



Decreasing the number of community labs



No longer support community labs



2012 2013 2014 2015 2016

MOOCs

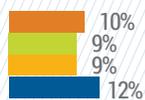
Institutional involvement in MOOCs (massive online open classes) continues to be diminishing, based on our data. In 2013, 56 percent of respondents stated they were exploring the value of MOOCs at their institutions, whereas in 2016, only 18 percent are doing so, which represents a 38 percent drop. In 2013, 38 percent of the CIOs said their institutions were not considering MOOCs. In 2016 that number increased to 67 percent who indicated that they were not exploring MOOCs on campus.

Level of Involvement with MOOCs

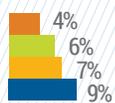
Working with other institutions to develop MOOCs



Developing courses to be delivered as MOOCs



Using MOOCs as a form of content for some courses



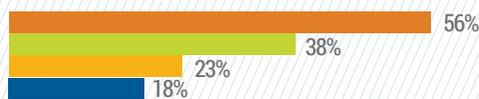
Using MOOCs to replace some current undergraduate courses



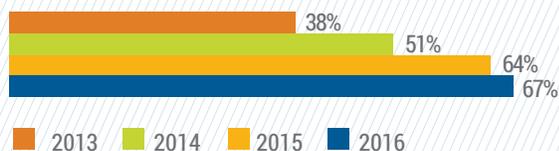
Using MOOCs for some remedial courses



Exploring the value, use and role of MOOCs



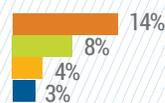
Not Considering at this time



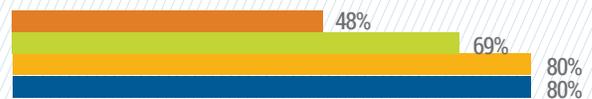
Working on projects that tie into an institution's strategic goals is key to higher ed institutions. Typically, if a project is not considered strategic, it will not have the staying power to continue getting supported at most institutions. Our data indicates that interest in MOOCs is diminishing. When asked if MOOCs are critical to the long-term strategy of an institution, we got a very clear message indicating that they are not. For two years in a row 80 percent of the institutions surveyed said MOOCs were not critical to their long-term strategy.

Importance of MOOCs To The Long-Term Institution Strategy

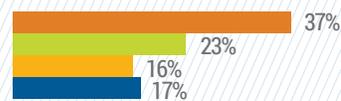
Yes



No



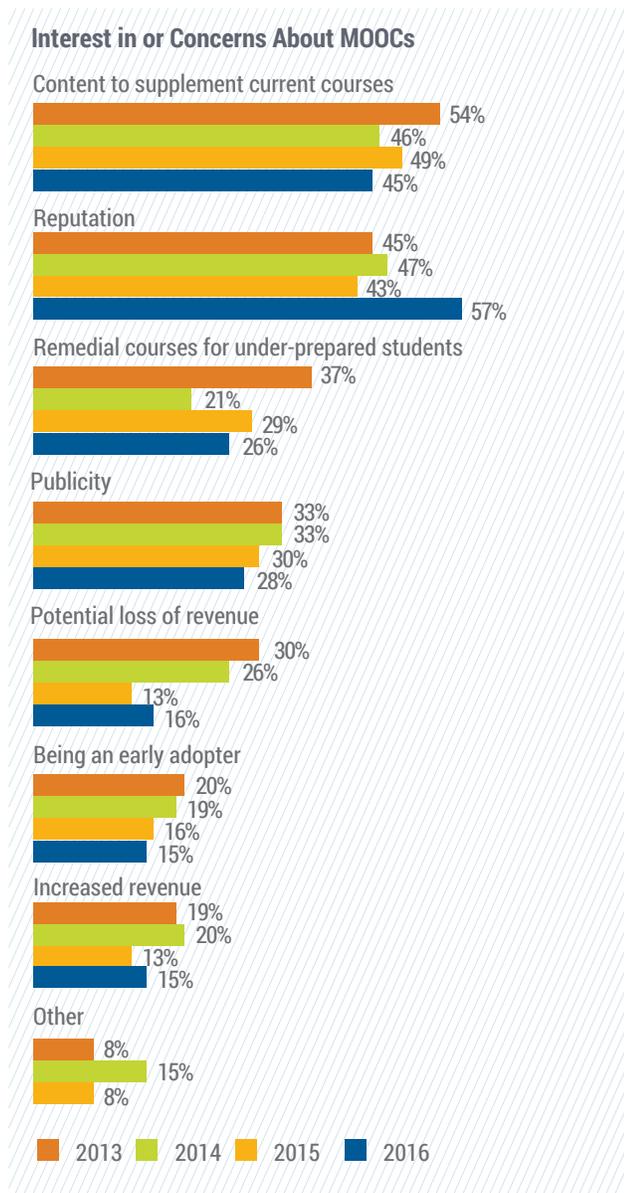
Dont know



2013 2014 2015 2016

While most schools are no longer evaluating MOOCs, those institutions using them cite 3 main areas of interest; “reputation” (57 percent), followed by “content to supplement current courses” (45 percent), and “publicity” at 28 percent. Overall there hasn’t been a drastic change in these numbers over the years. The only significant change was with insitutions reporting that reputation was important, which went from 43 percent in 2015 to 57 percent in 2016.

In summary we believe that the data suggest that the MOOC bubble has burst and that we will continue to see a drop in interest, because of the lack of strategic value that institutions believe results from investments in MOOCs.



INFRASTRUCTURE

Security

Security remains a top “keep you awake” item for CIOs. While the number of high visibility commercial breaches known to the public may have numbed reaction, it still remains a reputational issue as data exposure, productivity loss, and financial risks make substantial investments in security difficult if not impossible to avoid.

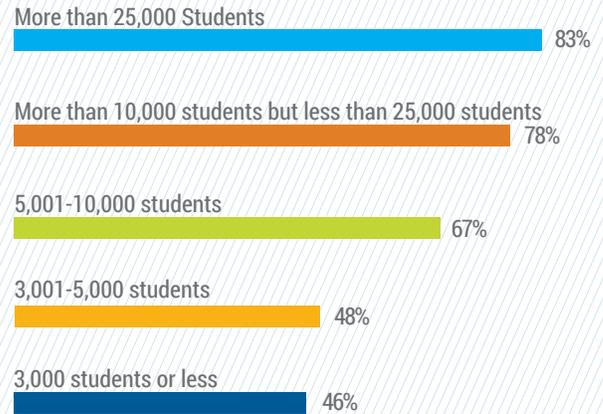
Costs are escalating due to the pace of growing sophistication and frequency of threats. For the third year in a row, respondents indicate a higher increase in percentage of IT expenditure on information security, as 75 percent now indicate increasing investments. The ratchet effect of this year-over-year increase is consuming a greater proportion of available resources.

How Has The Percentage of IT Spend on Security Changed Over the Past Five Years?

	2016	2015	2014
Increased	77%	76%	71%
Decreased	3%	5%	2%
Stayed the same	19%	19%	26%
Don't Know	1%	0%	1%

The need for a Chief Information Security Officer (CISO) continues to grow. Whereas 58 percent of all institutions reported a named CISO in 2015, that increased to 65 percent in 2016. This role appears to be highly correlated with institutional size. In institutions with greater than 25,000 students, 83 percent now have someone designated as CISO or planned within the next year. CISO continues to report predominantly through the IT organization, with 95 percent reporting this alignment.

Presence of Designated CISO by Institution Size



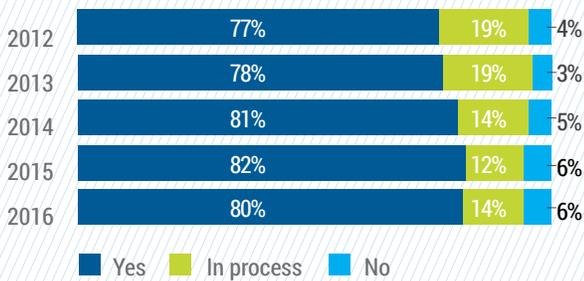
Multifactor authentication is an increasingly common approach to reducing some forms of threat, most notably phishing. In 2015, only 21 percent of institutions had implemented multifactor authentication, a number that increased to 32 percent in 2016.

Similarly, security planning and external security audits are growing areas of investment: IT security plans 56 percent, up 8 percent; annual updates 55 percent, up 10 percent; completed security audit 87 percent, up 10 percent. Penetration testing is one area of information security where respondents indicate no change over five years. Conducting such testing continues to hover at approximately 65 percent. Finally, many institutions respond with similar year-over-year perspectives on readiness in dealing with compliance requirements, with the vast majority continuing to deal with the issue. That situation may be more a reflection of an increasing compliance culture with growing expectations, rather than on a sense of progress. Work on security and compliance is never done.

Incident management

Plans to resume mission-critical operations in case of an incident remain largely unchanged from 2015. Again, over 80 percent have a plan in place, with an unchanged percentage “in progress.” Whereas many other statistics in this survey show trends toward completion over time, the five-year view of this item is consistent—14 percent +/-5 percent in process over last five years of this survey. While having a plan is perceived as important at many institutions, there may not be prioritization to finish it. Similarly, 29 percent have never tested these plans (a number that has also remained consistent +/-6 percent over five years.)

Plans to Resume Critical Operations in Case of a Crisis

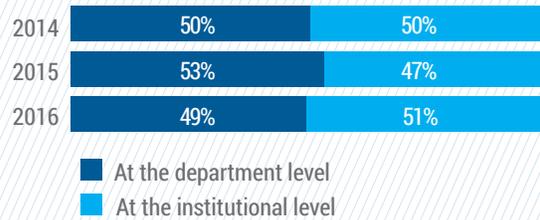


The number of institutions with fully redundant data centers is slowly rising, with “Yes-fully” and “Yes-partially” respondents now at 71 percent. This question may need revision as the number of institutions engaged in as-a-service offerings may veil the state of readiness, as many now look to external providers to reduce the internal investments required to perform this function.

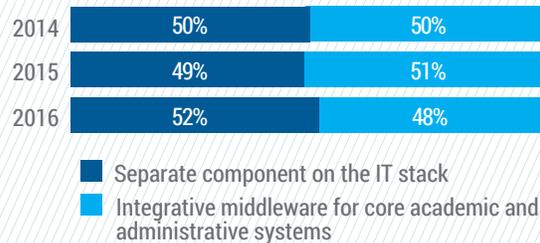
Other Observations

Document management responses are largely unchanged in this year’s responses.

Changes to Where Document Management Resides

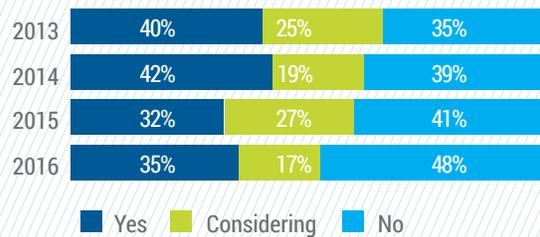


Changes to Types of Document Management



Individual institutional perspective on the use of digital repositories appears to be hardening, with movement from “considering” to “no” being the bulk of movement between 2015 and 2016. Of 27 percent responding “considering” in 2015, only 17 percent remain, and 7 of 10 have moved to the “no” column.

Use of Digital Repository Solutions



In conclusion, while not statistically meaningful yet, the apparent shift in increasing use of custom solutions is in contrast to the general industry trends and may bear watching over the next one to two years. Time will tell if this is simply a data anomaly of the reporting institutions or an early indication of shifting direction in solution sourcing.

CLOUD COMPUTING

When Considering New IT Investments, which is the Preferred Approach:

	2016	2015
Out-of-the box solution	90%	94%
Customized solutions	9%	6%
Homegrown solutions	1%	0%

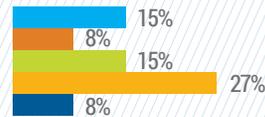
The use of cloud computing in higher education has seen significant growth over the past few years, and institutions are using the Cloud for a variety of activities. These activities range from relatively mundane back-office systems to advanced analytic cloud-based platforms. Reservations that initially inhibited cloud adoption have all but vanished on many fronts. Most institutions use cloud computing for a mix of academic and administrative needs. It is notable that during the past seven years, no institution has reported using cloud computing or related services for community service/outreach activities.

How Cloud Computing is Used

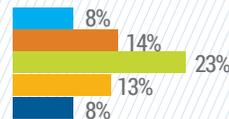
Mix of academic and administrative and community service



Mostly management needs



Mostly academic (teaching and learning)



Not sure

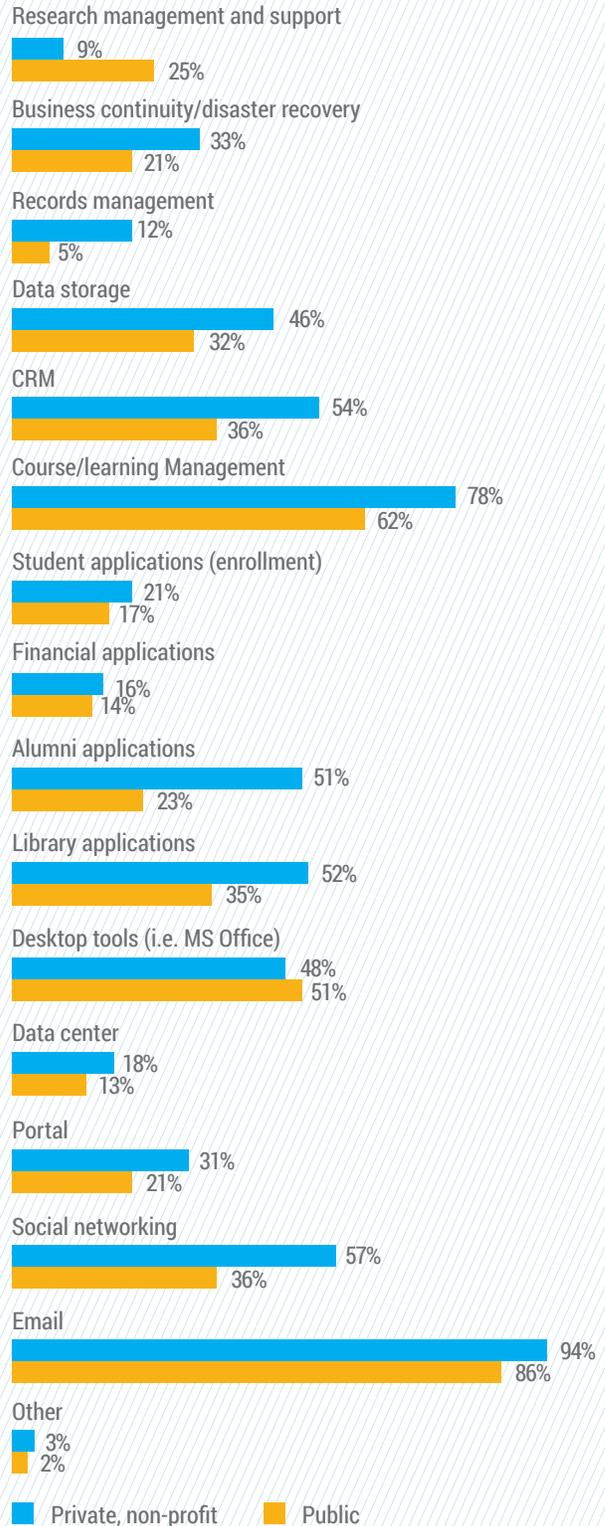


- 2-Year Institution
- 4-Year Institution
- 4-Year Institution with Master's-Degree Program
- Doctoral-Granting Institution
- Research University

Institutional size did not reveal major differences on how institutions use cloud computing, but there is a growing difference on cloud usage by type, public versus private. Use of the Cloud for academic and community purposes was highest at two-year colleges (85 percent), followed by doctoral institutions (78 percent), research institutions (74 percent), four-year institutions (60 percent), and four-year with some graduate programs (55 percent). The following graph indicates private universities have a greater adoption rate than public universities. The most common cloud applications implemented were learning management systems, library management systems, customer relationship applications, and alumni systems. Most interesting was that private universities led in every area measured except research management and desktop tools.

Further research is needed to identify the factors promoting implementation of cloud computing at private non-profit universities. A rationale for the difference might lie in the mandatory request for bid process (RFP) required at public universities. Relatively small staffing levels may be driving private universities 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 technology projects that can differentiate their institution and strengthen support for academic areas.

Areas in the Cloud or Moving to the Cloud



Factors Influencing the Use of Cloud Computing

Institutions indicated many factors influence their usage of cloud computing, with the highest percentage being access to data/information in the Cloud. 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. Surprisingly, only 51 percent of the respondents indicated that staffing limitations were an influence in cloud computing.

Factors Influencing the Use of Cloud Computing

Staffing Limitations

51%

Ability to bring new activities online quickly

66%
60%
73%
71%
61%

Access to data/information in the cloud

60%
57%
64%
73%
65%

Protection of sensitive data/information

77%
68%
70%
73%
66%

Ownership of data

61%
55%
55%
63%
52%

Concern about privacy

69%
56%
57%
66%
52%

Concern about security

68%
66%
64%
68%
67%

Saving money through the use of cloud computing

71%
69%
71%
71%
68%

Other

7%
6%
5%
9%
5%

2012 2013 2014 2015 2016

Use of Cloud Computing by Institution Classification

Four-year institutions reported protection of sensitive data/information as their highest influencing factor at 87 percent, a significantly higher percentage than for other institutional classifications. Two-year institutions had the lowest concern about the ownership of data in the Cloud with only 23 percent indicating it as an influence. Two-year institutions also had the lowest percentage (38 percent) when it came to concerns about privacy. The top influencers for doctoral-granting institutions were the ability to bring new activities on-line quickly and staffing limitations.

Factors Influencing the use of Cloud Computing by Institution Classification

Saving money through the use of cloud computing



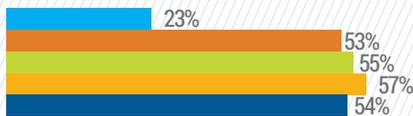
Concern about security



Concern about privacy



Ownership of data



Protection of sensitive data/information



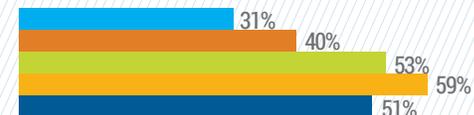
Access to data/information in the cloud



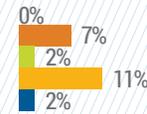
Ability to bring new activities online quickly



Staffing limitations



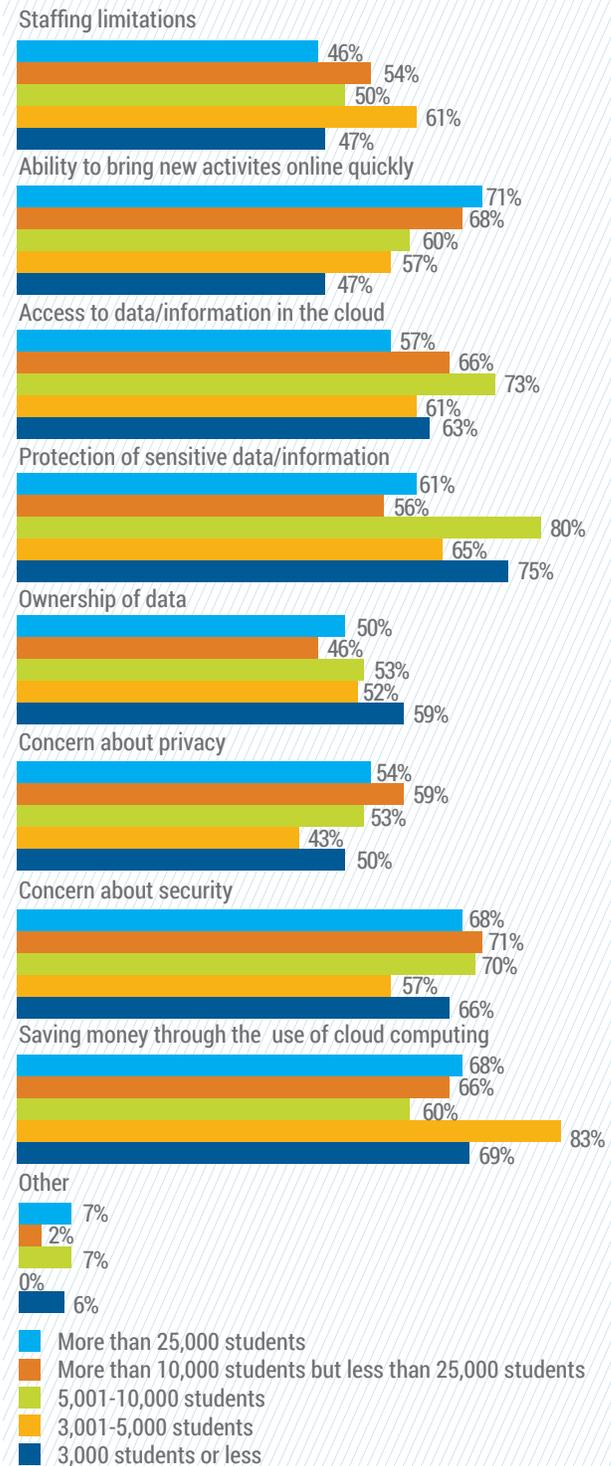
Other



- 2-Year Institution
- 4-Year Institution
- 4-Year Institution with Master's-Degree Program
- Doctoral-Granting Institution
- Research University

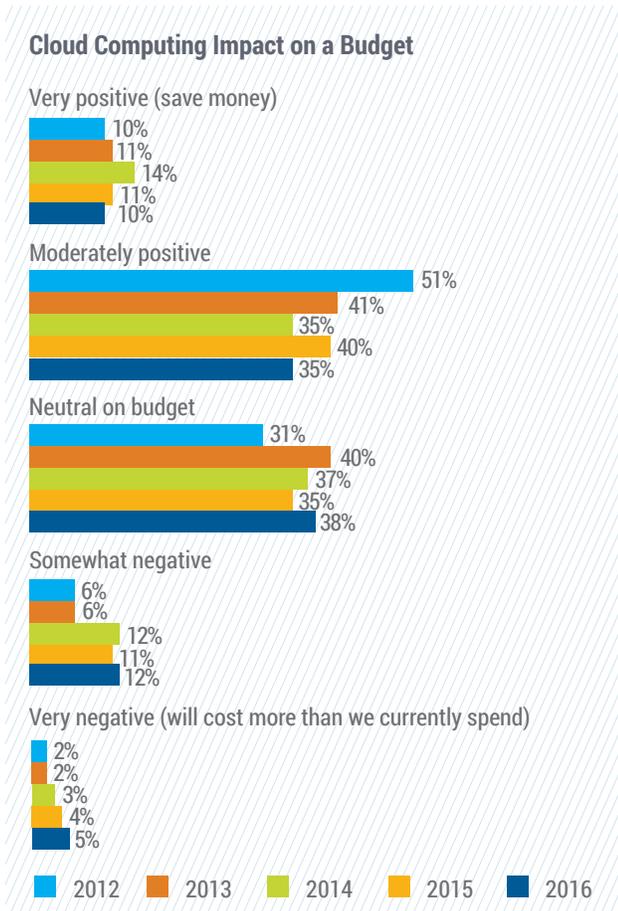
When reporting on factors influencing cloud computing, smaller institutions (3001-5000 students) cited saving money (83 percent) and staffing limitations (61 percent), while larger institutions reported saving money and the ability to bring new activities online quickly were major influencers.

Factors Influencing the Use of Cloud Computing, By Size



Cloud Computing Impact on a Budget

Competition in the Cloud is fierce, and price wars between Amazon, Google, Microsoft, etc., have driven costs down annually for many cloud-based 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 2016 from 2012.

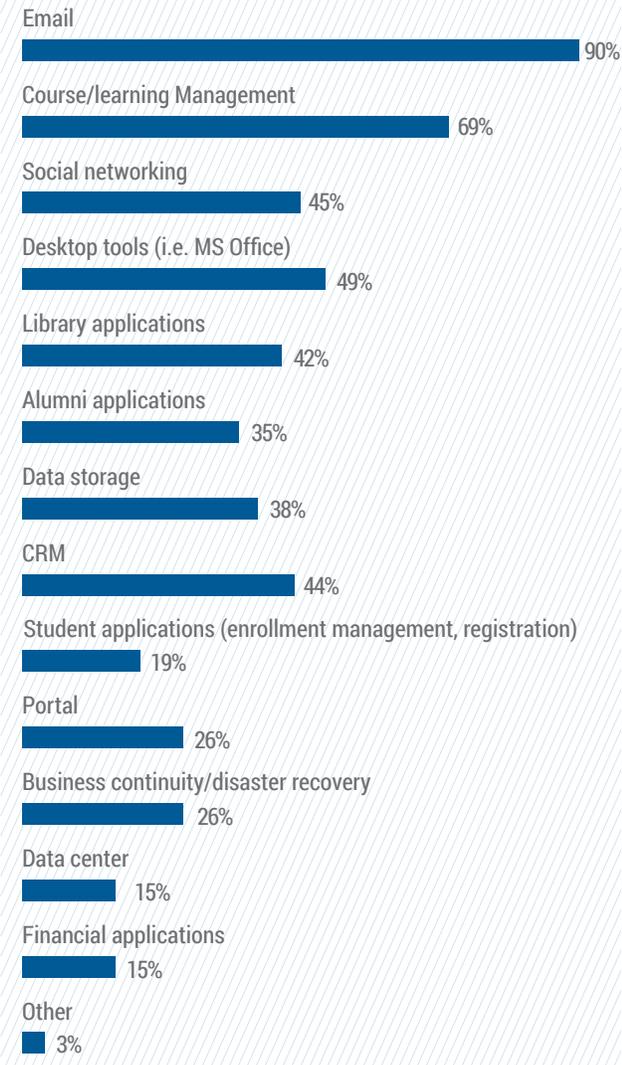


Most institutions expect cloud computing to have a moderately positive or neutral impact on budgets, with the exception of institutions with 10,001-25,000 students of which 22 percent expect a very negative or somewhat negative budget impact. While the numbers have changed slightly during the past four 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 90 percent indicating that they have placed mail 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 2016 (27 percent) is in the use of Desktop tools, i.e., Microsoft Office (49 percent in 2016 versus 22 percent in 2013), an increase 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.

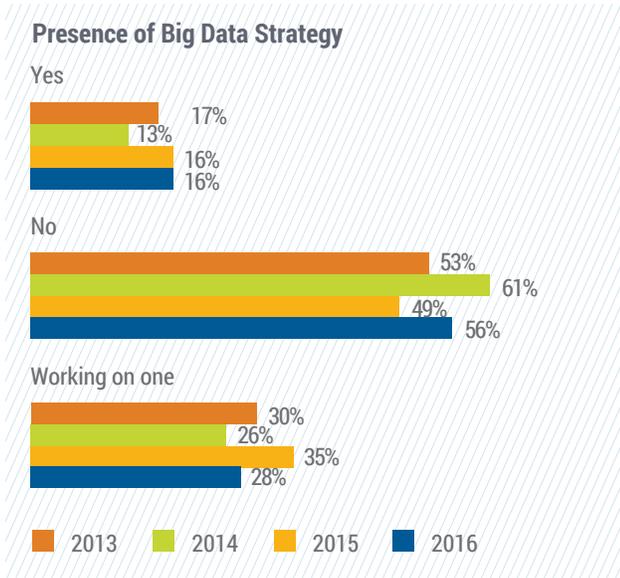
Applications in the Cloud



Data from the past few years shows considerable growth in the use of the Cloud for course/learning management (69 percent in 2016 up from 24 percent in 2012), alumni applications (35 percent in 2016 up from 21 percent in 2012), library applications (42 percent in 2016 up from 28 percent in 2012), and desktop tools (49 percent in 2016 up from 22 percent in 2013).

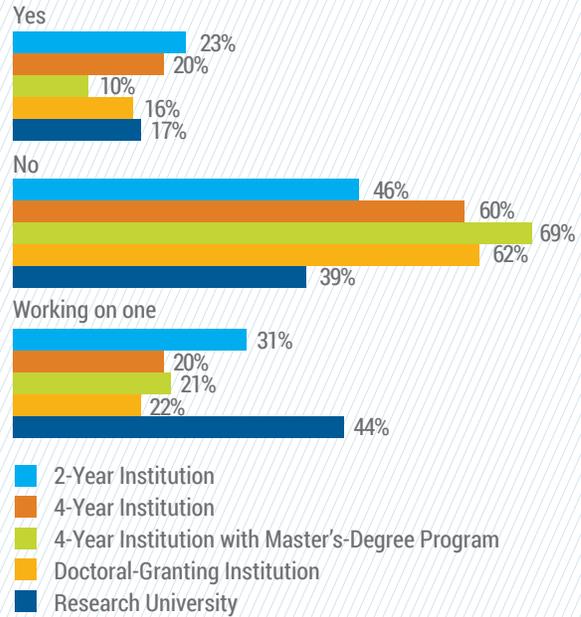
BIG DATA

Big Data has been a hot topic for higher education the past few years. While our questions concerning Big Data have been part of the survey for the past four years, we haven't seen a great deal of movement. More than half of the institutions indicated they do not have a Big Data strategy (56 percent) and are not working on one.



Institutional classification continues to be a determining factor, as research universities and doctoral-granting institutions are more likely to have a strategy or be working on one than the other classifications. Four-year institutions with master's degrees are the most likely not to have a strategy. It is interesting that more than 51 percent of two-year institutions either have a Big Data strategy or are working on one.

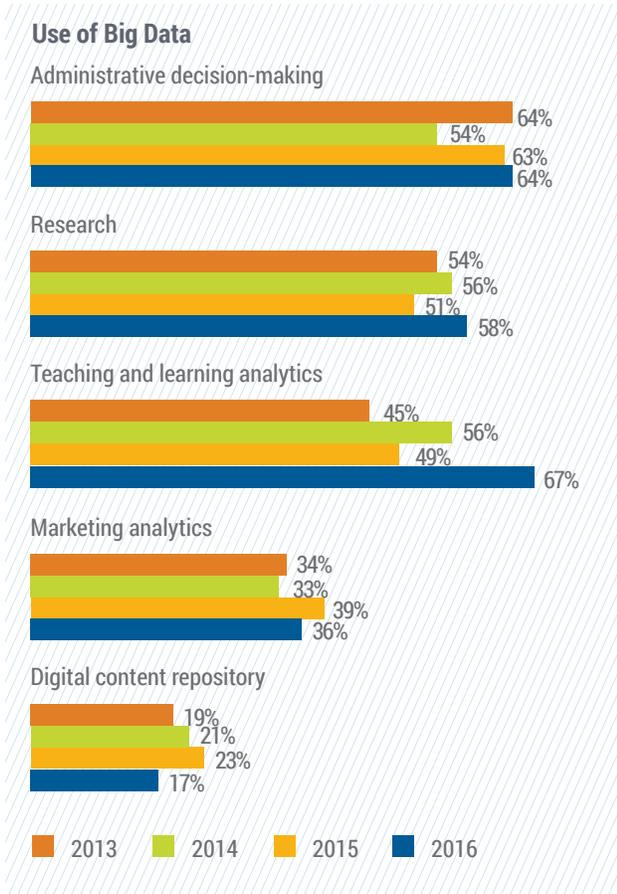
Presence of Big Data Strategy, By Type



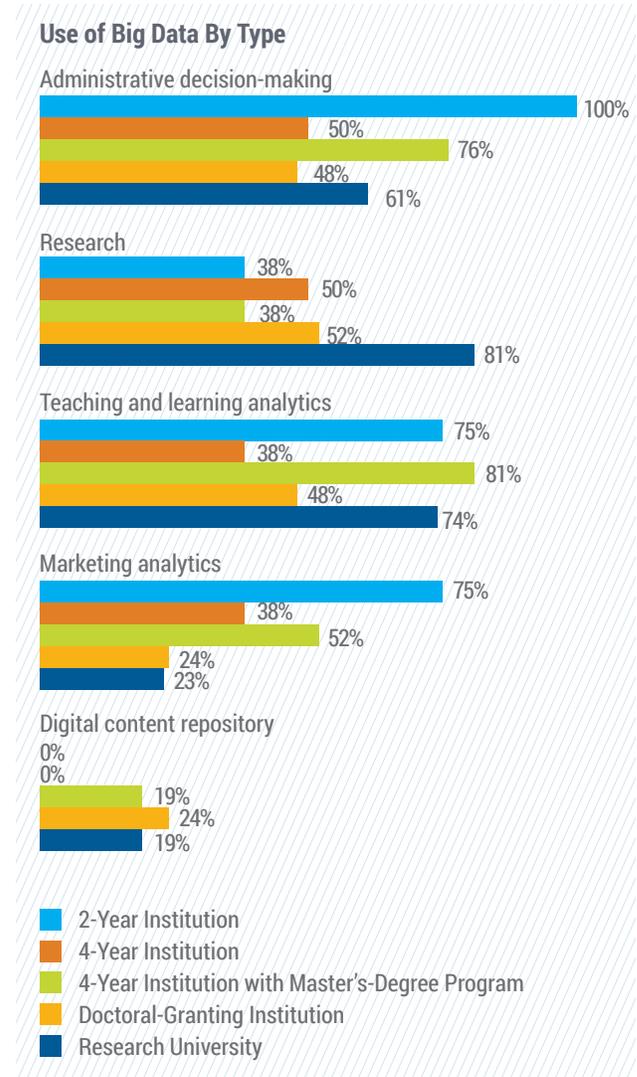
Size of the institution also seems to be important as smaller institutions (3000 students or less) are not as likely to have a Big Data strategy (73 percent) as other institutions. Larger institutions reported more attention to Big Data strategy either by having one (32 percent) or working on one (39 percent).

Big Data Usage

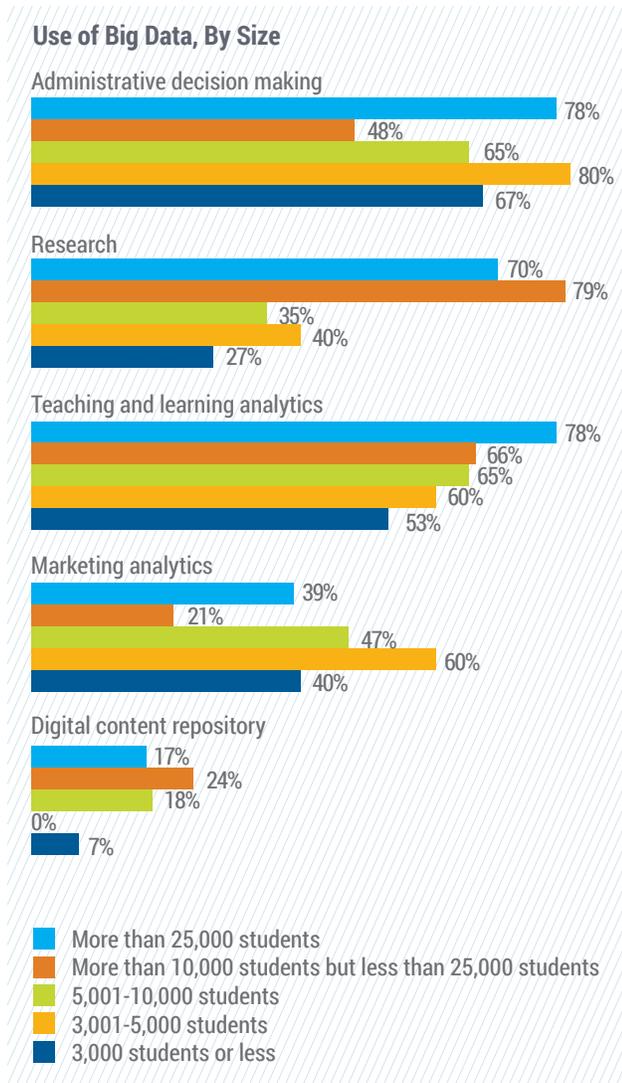
Higher education institutions leverage Big Data for different uses. The greatest use is in administrative decision-making (64 percent up from 54 percent in 2014), followed by research (58 percent), while the greatest use is now reported in teaching and learning analytics (67 percent up from 49 percent in 2015 and 45 percent in 2013).



By institution classification, research institutions reported higher use of Big Data in research (81 percent) and lower use of Big Data for digital content repository (19 percent). However, two-year institutions were more likely to use Big Data for administrative decision-making (100 percent) with lower use for research (38 percent).



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. However, security concerns are growing year after year (from 43 percent in 2013 to 56 percent in 2016) and bandwidth and identity management are next on this year's list.

WHAT KEEPS CIOs AWAKE AT NIGHT?

For a second year we asked the question “What is the one issue that weighs heavily on you or keeps you awake at night?” The responses are very revealing, as 41 percent of CIOs listed security and privacy issues at the very top compared to 31 percent in the 2015 survey. However, this year more than 24 percent listed staffing concerns, including hiring, retaining and retraining current staff compared to 13 percent in 2015; and 14 percent listed funding-related issues, slightly down from 13 percent in 2015.

There are a few interesting responses that indicate some of the frustrations with the job of CIO:

“Aging infrastructure and inability to design a reliable funding mechanism to sustain and enhance what we deliver.”

“Budget cuts continuing, more tech needs of students with less funding to support them and staff... ”

“Keeping up with growing scale of internal needs while maintaining an appropriate external vigilance for security threats.”

“Attracting and retaining highly skilled IT staff in an area of the country that has a booming IT labor market.”

“Keeping my organization happy and productive—worried that we’re one or two key departures from mediocrity.”

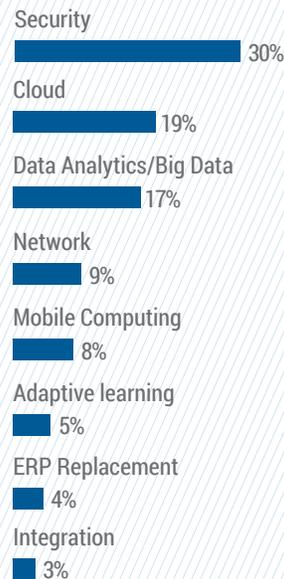
“Sustainability amidst explosive demand and budget cuts. Rigid, inflexible organization”

Some CIOs expressed concerns about the rising cost of higher education and how many people are beginning to question the real value (in dollars and cents) of a degree and whether we’ve reached a price point no longer attainable for many in the middle class. Others indicate a concern about the use of IT for teaching and learning and how to provide support for both learning technologies and pedagogy change.

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

For a second year we also asked CIOs what one technology they will have to invest in during the next five years. The results parallel what keeps them awake at night. Security is at the top of the list, revealing how that concern remains even after many years of investing and implementing new technologies and strategies for resolving security problems. Historically security was selected as the most important issue facing IT leaders in the 1984 CAUSE Current Issues survey. At a Gartner Symposium event in 2004, Bill Gates said, “I think within the next two years [security] will get off the top five list [of concerns].” While some IT leaders believe there will be an ultimate technology solution to protect an organization’s information asset in the future, CIOs overwhelmingly don’t agree.

Top Technology Investments for the Next 5 Years



While security is more than a technology, it is at the top of the list of CIO concerns. Institutions are willing to invest in any technology that promises to keep their information asset and their institution’s reputation protected.

SUMMARY

We hope this year's survey will provide some insights and maybe answers to questions and issues higher education CIOs face each day. However, as with most surveys, it will not tell a CIO what he/she should do or exactly what the future holds. The results do give us a picture of what is taking place and questions that remain.

What is taking place on many campuses:

- Budgets remain tight and there are no “silver bullets” for CIOs to use. They must grapple each year with how to provide services and support for existing technologies and systems while planning for change and future needs with limited resources.
- Financial resources are not the only resources that are difficult to manage and limited; human resources are also scarce. Hiring and retaining key personnel is very difficult and likely to remain so in the near future.
- The role of the CIO seems to be more firmly entrenched in the CXO culture as indicated by CIO reporting lines. In the 1994 CAUSE survey about 19 percent of CIOs reported to the CEO and that percentage has been climbing. In the seven years of our survey that number has moved to 39 percent. However, where the CIO reports is only one piece of the puzzle. IT strategic plans are included in the institutional budget planning process for more than two-thirds of institutions.
- While many businesses and industries have the ability to raise rates for services and change expectations by policy, higher education CIOs still work in a collegial setting, and the inability to charge fees or create new revenue streams limit options, as CIOs manage and plan for change and increased demands for services.
- The need to balance an institutional mission that supports teaching and learning, research, and community service drives IT decisions. However many CIOs find maintaining that balance getting more difficult, as this year's survey indicates that cutbacks in services and support were listed as a viable option for more than half of the institutions facing tight budgets.
- The use of the Cloud continues to gain momentum, and some CIOs may find some of their security headaches can be shared with a vendor.
- Many institutions have found the use of their course management systems fully entrenched, and it may be that changing the CMS isn't just about tight budgets but institutional resistance to change.
- MOOCs seem to be more media hype than reality for most campuses. However, their use may increase as other purposes for MOOCs (content for online, hybrid, or even face-to-face courses) emerge.
- Big Data does seem to follow big institutions, but analytics is likely to be a part of most IT organizations' management purview in the future.
- Security issues and concerns are not going away and despite tight budgets, funding for security is increasing each year for most institutions.

The following set of questions and issues illustrate some of the significant areas that might need to be addressed in future surveys:

- Can IT move from a traditional model of restricting users to a set of pre-approved technologies to a model of experimentation and adoption?
- Can we say “yes” more often than we say “no”?
- Will consumerization of technology and the collegial management style impact the type of CIO who works in higher education?
- Will the CIO's reporting relationships (to the CEO, CFO, or CAO) affect IT support for all of the components of the institutional mission?
- How can institutional IT ensure security in a decentralized and mobile environment?

- What are some truly disruptive educational applications of technology for which CIOs must plan in the future?
- How will new technologies (like voice-command interfaces) impact higher education systems? Should students be able to say “Register me for MATH 101 at 9 a.m.” and have an appropriate response from the student information system?
- Do our existing (and planned) systems support a “phone first” approach to interaction?
- Is our campus infrastructure adequate for an explosion in devices (wearables, Internet of things, Bluetooth beacons, etc.)?
- What benefits could be obtained by institutional use of robots and drones?
- Is virtual reality nearing a critical-mass level so that it will have significant impact on education?
- How can crowdsourcing and other social media tools enhance IT customer support?

We must also answer the question that was addressed at the end of last year’s survey. IT workers who can quickly master new technologies continue to be scarce. Is higher education doomed to be an IT farm team for the vendor and corporate IT big leagues? Time will tell, but CIOs this year indicated they are aware of the problem and are working to solve it. We will continue to add or change questions in the survey to help provide insights and answers to these and other questions.

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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 mzaastrocky@lbcio.org

Or visit the LBCIO website at:
www.lbcio.org

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Chief Information Officer
University of Nebraska

The Form That Is All Function



ENROLLMENT MANAGEMENT

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

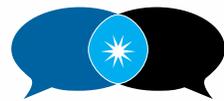
BUSINESS ADMINISTRATION

Accounts Payable
Vendor Management
Contract Management
Procurement & Purchasing
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Facilities Management

ADDITIONAL CAMPUS SOLUTIONS

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Leadership Board for CIO's

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