

INFORMATION TECHNOLOGY
IN HIGHER EDUCATION
2019

**EXECUTIVE
SUMMARY**

**Ten Years of Surveys of
Chief Information Officers in Higher Ed**



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CONTENTS

Introduction	1
Overview of survey instrument and responses.....	3
CIO Characteristics	4
Financing IT and Budget Issues.....	8
The IT Organization and Governance	9
Administrative Technologies.....	13
Academic Technologies	15
Security and Infrastructure.....	18
The Cloud, Big Data and Digital Repositories	21
Leadership Issues	23
What Keeps CIOs Up at Night.....	25
What is The One Major Obstacle to Innovation	25
What is The One Technology You Will Invest In	26
Summary and CIO Quotes/Insights.....	26

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2019 CIO Survey

Introduction from Dr. Michael Zastrocky, Executive Director

This is the tenth survey of CIO's conducted by The Leadership Board for CIO's in Higher Education (LBCIO). This year's survey will look at ten years of data and provide insights from our members on what we have learned during this time. The format will be somewhat different from prior annual reports and will offer CIOs an overview and thoughts from CIOs in higher education on what the data reveals. We will use LBCIO member analysis and infographics to highlight some of the results from our surveys and will highlight what we think is significant. We will also share some of our personal experiences as they relate to specific issues.

The Leadership Board for CIOs was formed by The Chronicle of Higher Education and me in 2009. During my career in higher education, I found that as communications technologies advanced, personal relationships within the community of IT leaders in higher education became more difficult to cultivate. During the early years of my career, I could go to a major conference such as CAUSE, CUMREC or EDUCOM and meet peers from many different institutions who would sit down over coffee or a meal and were willing to discuss issues we were facing. Those personal contacts and relationships were extremely important to both my institution and me. As meetings grew from hundreds of attendees to thousands, personal, face-to-face communication became more difficult. Regional or state groups for CIOs in higher education like OHEC (the Ohio organization for CIOs), NJEdge, or CHECO are important. System meetings for CIOs such as the California State University System or City University of New York System are fundamental for building personal relationships within the profession, as do other peer groups such as the Big 10, the Jesuit conference (AJCU) or Ivy League meetings for IT leaders. However, personal communication during meetings between diverse institutions from many different states and countries is extremely rare and difficult to establish. At LBCIO, we bring together CIOs from truly diverse institutions, public and private, 2-yr, 4-yr, doctoral and research, and different countries.

During my time at Gartner, I worked to set up a one-day meeting for higher education IT leaders at the beginning of the Gartner Symposium. The intent was to bring leaders together from a diverse group of institutions to talk about key problems facing IT leaders in higher education. This worked well, producing discussions that were lively and very productive. However, attendees were most often from institutions with enough resources to provide for the high expense of Symposium meetings and the format was based on presentations from analysts. When I retired from Gartner, I explored ways to provide a small forum for higher education CIOs to come together and share in the same way I was able to experience during my early years as an IT leader. I toyed with the idea of a "Roundtable" group to come together with low costs and less formal presentations and discussion topics set by members. At the same time, The Chronicle of Higher Education approached me to discuss working together on a way to build relationships between IT leaders and personal discussions that mirrored the ideas I had been

considering. We met several times and from those meetings came the model for LBCIO. We decided that meetings would only include CIOs from higher education and protégés. This was to ensure that creative thinking and personal comments could be shared without concern for those comments leading to sales calls and campus personnel up in arms over an idea being discussed that may never come to light. The idea was “what is said at LBCIO meetings stays at LBCIO meetings.” This was and remains important because all of us grow from sharing thoughts about technologies and applications that might never come to our campuses. In our first year, dues were set to include costs of meetings at hotels in major cities and to record the discussions for those unable to attend. At the end of the first year, The Chronicle asked if I would be willing to take on LBCIO as an organization separate from the Chronicle. This would provide them with the ability to be more objective in their reporting of survey data and reports from LBCIO.

In 2010, we restructured LBCIO and lowered the dues/subscription by having member institutions host meetings on their own campuses. This provided member CIOs and their protégés (dues include a member identified protégé at no extra cost except for travel) with a chance to visit other campuses and see projects that were being discussed firsthand. Two meetings a year are held on campuses and topical meetings are held online on a regular basis. The size of the board is limited to no more than fifty members to ensure each member will have the ability to participate and share in discussions. We do allow for recently retired members to participate at no charge as emeritus members. This gives a broader experience base for discussions and mentoring of protégés and younger IT leaders.

The LBCIO survey was initiated to provide 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 a story of what CIOs are currently undertaking and what they are thinking about the future. The questions are asked in such a way as 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 budget specifics. We hope you will find some useful information and insights that will provide a look backwards to help in planning for the future.

I want to thank Jessica Abel from the University of Texas at San Antonio, Jim Bradley from Trinity University, Jim Burke, from John Carroll University, Larry Conrad from the University of California Berkeley, Maureen Coughlin from Teachers College Columbia University, Paul Czarapata from the Kentucky Community and Technical College System, Loretta Early from George Washington University, Tim Ferguson from Northern Kentucky University, Vince Kellen from the University of California San Diego, Kendra Ketchum from the University of Texas at San Antonio, Zareh Marselian of California Lutheran University, Don Mihulka from the University

of Nebraska, Brian Nichols from the University of Kentucky, John Rathje from Kent State University, Tina Stuchell from the University of Mount Union, Rod Tosten from Gettysburg College and Nelson Vincent from the University of Cincinnati.

I especially want to thank Jan Fox and Doyle Friskney for helping with the survey and this year's report. Jan and Doyle have spent many hours working with the text and the data and graphics. Their insights and collaboration have been extremely important to me and this report. I also want to thank Jessica Abel for her work with the infographics in this year's report and Ed Aractingi and Marshall University for their final work on the survey.

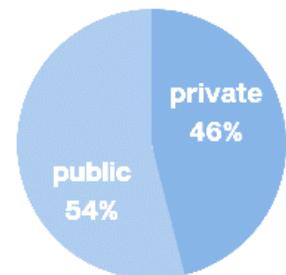
Thank you all for your work on the Leadership Board for CIOs in Higher Education.

Michael Zastrocky

Overview of the 2019 Survey Instrument and Responses

We have tried to provide a level of consistency from year to year in order to deliver some longitudinal data. However, some questions asked in the past were dropped because either the topic was no longer relevant, or the data provided no new insights. For example, ten years ago, a major topic of discussion among higher education CIOs was consumerization. In the 2013 LBCIO survey, almost half of respondents indicated that consumerization was having a significant impact on their campuses as they wrestled with how to provide access and service for an expanding list of personal owned devices. However, by 2018, the question was dropped in favor of more important questions concerning how faculty and senior staff view IT. Some questions have remained the same for ten years and we will provide insights on what ten years of results may mean. You will notice that some sections will report data from less than ten years because questions were added or changed at different points in our data gathering.

Demographics for survey responses for 2019 are as follows: 54% came from public institutions, while 45% came from private, non-profit institutions and 1% from private for-profit institutions. 24% of responses came from research universities, 20% from doctoral granting institutions, 26% from 4-year with master's level degrees, 12% from 4-year institutions and 18% from two-year institutions. The size of the institution also varied as 26% were from 3,000 student FTE or less, 19% from 3,001 – 5,000FTE, 18% from 5,001 – 10,000, 23% from more than 10,000 but less than 25,000 and 16% from more than 25,000 FTE. Responses came from institutions from North America, Europe, Australasia, and Africa. However, no responses were received from South America.



Who are CIOs in higher education; what are their characteristics?

85% of CIOs are over the age of 46—up from 80% in 2012

Over the past ten years, we have found some trends in the characteristics of CIOs in higher education. They tend to be aging and are staying in their current positions longer. Their organizations are more complex and the issues they address often come with limited resources and answers. Support from the rest of the institution's leadership is often mixed; many CIOs do not trust their peers or their bosses to understand or care about the issues and sleepless nights many CIOs face.

As baby boomers reach retirement age, the aging of the workforce is becoming more urgent. As Michael Zastrocky and Frank Schlier have written for EDUCAUSE and Gartner, “the graying of the information age” seems to be in full bloom. Zastrocky and Schlier assert,

The graying of IT management in higher education is here. Institutions have a very short time to begin to train and prepare the next generation of CIOs and executive leaders in higher education. Turnovers will likely increase as demand for talent increases. Institutions need to improve their compensation programs and work environment in order to retain and recruit IT talent.

A major concern for many IT leaders is that some young and strong leaders do not aspire to the role of the CIO. As one young IT leader recently put it, “why do I want the headaches and long hours of the CIO? I make enough to support my family and actually have some time to enjoy them. Why do I want to give that up for a few dollars and a lot more responsibility?” Similarly, another senior IT leader recently left higher education for “higher pay and more family time”. In the LBCIO surveys we have found that CIOs are getting older. In 2012, 80% were over the age of 46 and today it is up to 85% while those younger than 36 are at 15% down from 17% in 2012. More than 28% of CIOs have been in their current position for 10 years or more compared with 20% in 2012. However, concerning their experience as a CIO, 47% have been a CIO for more than 10 years down from 52% in 2014. The aging of the workforce has undoubtedly impacted institutions, some of whom are actively working on ways to keep senior IT leaders around longer—or at least available to train future leaders.

The business of higher education would suggest that the formal education level of CIOs in higher education would have increased over the past decade as people are increasingly earning terminal degrees. However, the opposite seems to be the case for CIOs in higher education. Only 18% percent of CIOs in the 2019 survey have terminal degrees (e.g., PhD,

EdD, MD, JD, etc.) compared with a high of 29% in 2012. A terminal degree, while unnecessary to do the work of the CIO, does present the CIO to the academic community as a peer and can be of help when dealing with faculty and academic administrators. Some of this change may be tied to active recruitment of CIOs from the corporate sector, where a terminal degree is not an advantage. The academic community often distrusts them, and it may take those coming from outside higher education some serious planning and work to build a trust that comes more naturally for CIOs who come from higher education.

The role of the CIO is still dominated by men. Over the past decade, a consistent 75% of CIOs have been men. When looking at IT organizations such as EDUCAUSE, however, the role of women is more balanced. Programs for recruiting and training women for IT leadership have long been a key strategy for EDUCAUSE and the earlier CAUSE and EDUCOM organizations.



To whom the CIO reports has been holding steady over the past ten years: more than a third (35%) report directly to the CEO of the institution. However, there has been a movement away from the Chief Academic Officer (CAO) to the Chief Financial Officer (CFO) or Chief Operating Officer (COO). From 2011 to 2014, 25% reported to the CAO, however in 2019 only 13% report to the CAO while 27% report to the CFO (up from 19% in 2011) and 22% report to the COO (up from 19% in 2011). Ten to fifteen years ago, Learning Management System (LMS) use saw significant growth. As a result, CAO's were directly involved in the use of IT and wanted oversight of the changes that IT was making in teaching and learning. Today, the LMS is firmly in place and expected and CAOs generally don't want the hassle of oversight for all of IT. On the other hand, as IT use and subsequent cost increases continue to grow, CFOs want oversight to ensure that the institution is getting as much value as possible from IT spend.

When asked what one issue keeps the CIO awake at night, 50% indicate that security issues keep them awake while about 20% say budget issues. When asked to what degree does the leadership of the college—e.g., the board of trustees, president, president's cabinet—understand how much this particular issue challenges the institution and its academic mission, only 10% answered completely, 33% said mostly, while 46% said somewhat and 10% replied not at all. When more than half of the leadership have limited or no understanding of the problems the CIO is facing, CIOs carry a sizable burden.

CIOs also face problems dealing with leadership's lack of understanding of IT issues and how much IT supports the work of the institution. Almost 75% of CIOs believe executive leaders underestimate staffing and budget problems CIOs face, while over 60% of CIOs think leadership underestimates how much IT supports faculty, including research and teaching. This lack of understanding leads to CIO's sleeplessness at night as CIOs know how much IT is the lifeblood of today's higher education institution and why security issues are so important. A breach could bring the institution to its knees. They also know there is no chance today to bypass IT and manually handle the administrative and academic functions of the institution if IT is unavailable for any length of time. Administrators cannot do their work manually nor can faculty provide for online, hybrid or face-to-face courses without access to the net and content distributed by the net. We have long ago reached the point where there is no going back to "old ways of doing business".

CIO CHARACTERISTICS IN HIGHER EDUCATION



44% are over 55

38% are between
46 & 55

14% are between
36 & 45

1% are 35 &
younger

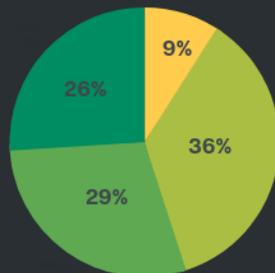


Today, 23%
of CIOs are
female

Whereas in 2012,
29% of CIOs held
terminal degrees,
in 2019 only 18%
do.



Years in Current Position



9% have served 1 year or less

36% have served for more than 1 but less
than 5 years

29% have served for 5 years or more but
less than 10 years

26% have served for 10 years or more

Financial and Budget Planning

Throughout the past fifty years, higher education budgets have lagged behind the general economy. If the general economy went into a downturn or slump, higher education institutions would follow a year or two later. Higher education budgets are generally approved 18-24 months before they are implemented and so the downturn in higher education has most often lagged behind. The same has been true for when the economy is in an upturn mode: higher education budgets follow 18-24 months later for the same reason. However, in the past 10 years, higher education institutional budgets do not seem to follow any cyclical pattern. Budgets have been tight, and upticks are not following any particular pattern. Institutional operating budgets have been somewhat erratic over the last ten years, but an average of 42% of the institutional budgets grew from the previous year with only 28% decreasing. IT operating budgets followed a similar pattern but did not always match the growth of the institutional budget. Institutions that had a budget decline over the previous year most often used delayed maintenance or replacements as a method to weather the storm. However, one disturbing trend seems to be that new initiatives seem to be less likely to be funded when dealing with tight budgets. This runs counter to the overall institutional need for IT solutions to provide greater service demanded by students, faculty, staff, alums and other constituents and the need for increased security to protect what has become a major asset of the institution.

WHAT HAS BEEN CUT FROM IT BUDGET

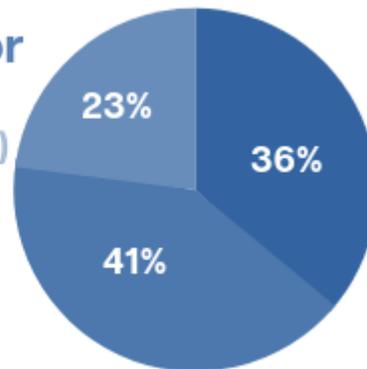
Delayed maintenance or replacements, 51%	New Initiatives, 39%	New IT investments (hardware/software/services), 36%	Software licenses, 29%	Services, 28%
Personnel, 41%	Travel, 37%	Professional development, 30%	Nothing has changed, 21%	Consulting services, 20%
				9%

Budget expectations for next year are not overly optimistic; most expect their IT budget to remain the same. This means that many IT organizations continue to be pushed to do more with the same or less.

Budget Expectations for Next Year

(based on current fiscal year)

23% expect decrease
36% expect increase
41% expect the same



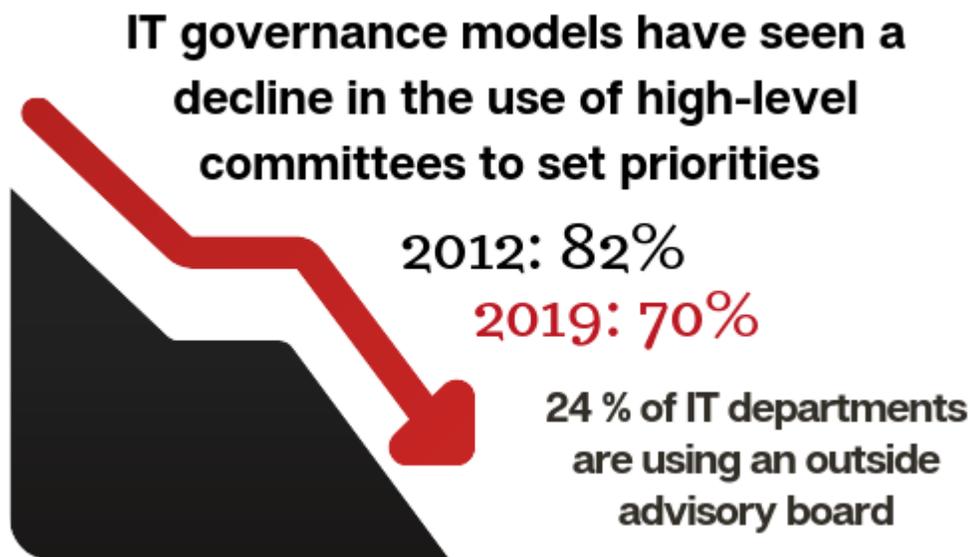
Over the last ten years, 69% of the IT Strategic Plans have been linked to the budget planning process. This is a very positive sign because the budget plan is the crucial plan for getting things done. As Peter Drucker has emphasized, “what gets measured gets done.” Put another way, what makes it to the budget gets done! Student technology fees are increasingly charged as a semester fee for all students. This is a problem especially when the common perception is that tuition is already too high. Over the years, most student technical fees have increasingly moved to the general fund rather than to the IT budget. This creates an illusion among students that what they are paying for with tech fees should provide for new and expanded IT services. However, that is too often not the case, often leaving the CIO in a public relations bind.

IT Organization and Governance

The IT organization in higher education has changed drastically in recent years. While many have had to grow FTE in security and support for academic technologies, the overall IT staff remains about the same in number for most institutions. This requires the CIO to juggle staff positions in some areas while increasing support staff to handle increased need for security and other areas including academic support. Some years ago, IT leaders (there wasn't a term CIO in the 1970's and 1980's) were able to take advantage of technology changes that required less staff for operations and backups and used those slots to bring on board or retrain staff to handle the growing areas of PC management and maintenance and wide area

networking. The problem facing CIOs today is one of new technologies to the institution requiring more people, not fewer. In some institutions, IT support for academic strategies such as the Learning Management System (LMS) has shifted to the CAO as IT staff remains thin and academic leadership wants more direct control over support for all aspects of teaching and learning. This shift is an example of the waterbed principle. If you push down on one part of the waterbed, another part of the bed must go up. If IT cannot handle the demand for support in one area or another, then that area will hire or retrain staff to handle increased demand for IT support in their area.

Gartner defines IT governance as the processes that ensure the effective and efficient use of IT in enabling an organization to achieve its goals. Many CIOs set the tactical and strategic goals for the IT organization utilizing various IT governance models. IT governance can be very simple or quite complex with multiple committees, task forces and blue-ribbon panels as part of the governance model. Over the last nine years, IT Governance Models have seen a decline in the use of high-level committees to set the priorities with a high of 82% in 2012 to a low of 70% in 2019. In the same years, the trend to use an outside advisory board increased from 14% in 2012 to 24% in 2019.



Over 90% of CIOs indicate that IT governance is important to them and only 7% indicate it is of little or no importance. These numbers have not changed over the past ten years. However, the extent to which CIOs rely on IT governance is another issue. While two-thirds of CIOs rely completely or place relatively high importance on governance, one-third either place little or no importance on IT governance. This means that some who think governance is important do not rely on it. On one hand, a leader is expected to listen to those who are affected by a decision. On the other hand, sometimes good leaders listen but their experience or their understanding of technical, political and other considerations leads them to decide different from the governance input. A problem occurs when those who are affected by a decision do not believe their concerns are being heard. They may become an adversary rather than a collaborator. Another key data point is that only 16% indicated that IT governance is linked to budget planning while 40% said it was not linked at all. Ultimately, the true success of all planning efforts can be reflected in its impact on budgets.



Full time staff for IT has stayed the same for most institutions over the past ten years. In 2019, 50% reported their IT staff stayed the same while 26% reported that IT staff decreased and 24% reported the IT staff increased. This set of numbers has been stable over the past ten years with some years increased staff slightly ahead of decreased staff reported but staying the same is the name of the game for most CIOs. For 2019, most CIOs indicated that their staff size would stay the same (59%), but 24% expect their IT staff to increase while 16% expect their IT staff to decrease. This likely reflects a better economy overall and pent-up demand for support being addressed.

Many institutions use outsourcing to support some IT services. In many instances, the use of outsourcing allows IT staff size to remain the same or decrease while improving or increasing services and support. One reason for this is that some CIOs find it easier to get approval for outsourcing than for increased staff. Another advantage with outsourcing is that skilled staff can be acquired in a needed area almost instantly. Overall during the past ten years of the LBCIO survey, more than 53% of CIOs reported increased use of outsourcing while in the past three years, increased use of outsourcing has slipped to 43%. This may change as 56% expect outsourcing of IT services and support to increase next year up from 49% last year while 38% expect it to stay the same, down from 45% last year.

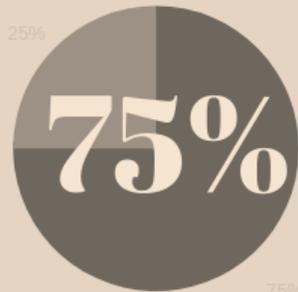
CHIEF SECURITY OFFICER



Over the past decade, there has been a steady increase in institutions naming a Chief Security Officer (CSO)

65% of surveyed institutions have a designated CSO

9 times out of 10 of CSOs report to the CIO



of CIOs feel security is more difficult to manage and protect against than in the past

THEN:



NOW:



In 2019, 79% of institutions report having business resumption plans, but 36% of the time, the plan has not been tested

SPEND:

Over the past five years, an average of 74% of CIOs increased the percent of IT spend on security.

- increased external penetration testing
- increased use of cyber insurance
- increased implementation of multi-factor authentication

IT GOVERNANCE: IMPACT

Over the past decade, an average of 64% of CIOs feel IT Governance is very important, with 30% indicating it is somewhat important



more than 60% of CIOs rely fully or highly on IT Governance to make decisions

About 80% of CIOs complete a security audit each year or every other year



In 2011, only 51% of CIOs had formal security plans. In 2019, more than 62% have such plans.

almost 2 in 3 update that plan annually

12% do not have a plan at all

Administrative Technologies

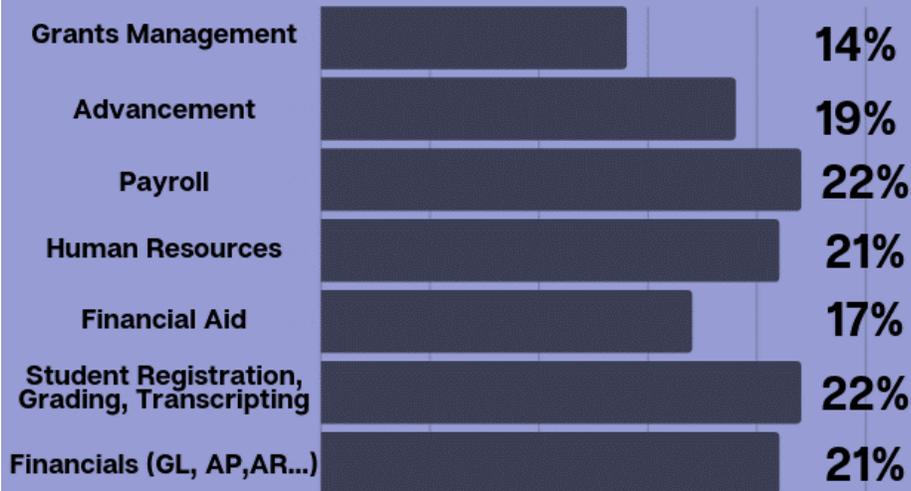
Some years ago, the president of a university was asked about differing amounts of resources allocated for administrative computing versus academic computing. He responded that “while teaching and learning is our core business, if we don’t manage our resources it won’t matter what we spend on academic computing as we will be out of business.” Managing resources is crucial to all organizations; the history of the use of IT for management started years ago with ADP (Automated Data Processing)/EDP (Electronic Data Processing). Higher education IT management began with mainframes and software written in-house to support financial management. The first CAUSE survey in 1979 provides a link to the beginnings of IT management in higher education, where over 90% of software used was homegrown. Software applications provided by vendors began to gain in popularity among many institutions, especially those with limited IT experience and resources. By 1994, The CAUSE survey indicated that proprietary applications accounted for almost 60% of all applications. Gartner first used the abbreviation ERP in the early 1990s to represent enterprise resource planning for manufacturing. The term ERP became a synonym for proprietary management systems in higher education by the end of the 1990’s, as a rush to resolve Y2K problems created a near panic in the higher education ERP market. From 1995 to 2000, almost 40% of all higher education institutions were moving towards new ERP systems to replace aging home-grown or proprietary applications and fix Y2K.

In 2019, 88% of CIOs reported using vendor-supplied ERP applications and more than 90% of the time the vendor-supplied modules included financials, student, financial aid, HR, payroll and advancement. For the last ten years, homegrown core administrative applications have continually declined from a high of 7% in 2010 to only 1% in 2019. Over the past 10 years of our LBCIO survey, outsourcing administrative applications has been consistently low, fluctuating only between 0 and 2%. This does not align with what we often hear in industry about the significant move to outsourced solutions. A contributing factor in this may be the strong desire of higher education leaders to protect, control and “own” their data.

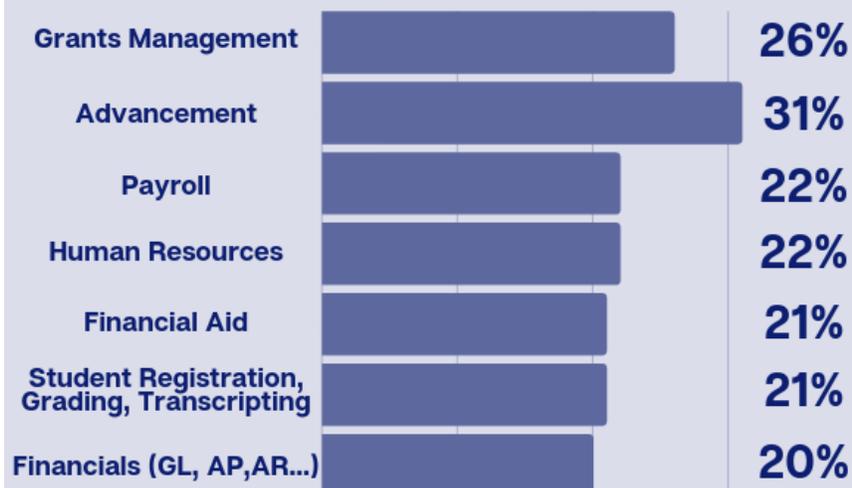
In the late 1990’s and early 2000’s, there appeared to be a trend to follow a “best of breed” approach to ERP. However, institutions following a best of breed approach have only fluctuated 5% (between 6% and 11%) over the past 10 years, debunking that approach as a trend. Note that best of breed involves mostly a mix of proprietary applications. Clearly, there will be a larger, growing demand for expert support and consulting resources in ERPs over the next 5+ years, as institutions begin to implement new/upgraded vendor solutions and the crunch for expert resources will occur by 2024-2025.

Currently many institutions indicate they are in process of implementing or updating their administrative applications or are planning to implement in the next 2-3 years. Tight budgets the past few years have found institutions holding off on major updates or new implementations. However, at some point institutions must make the move. More than 20% are making the move to update or implement major applications.

Applications in process of implementation



Plans to implement new or major upgrades in next 2-3 years



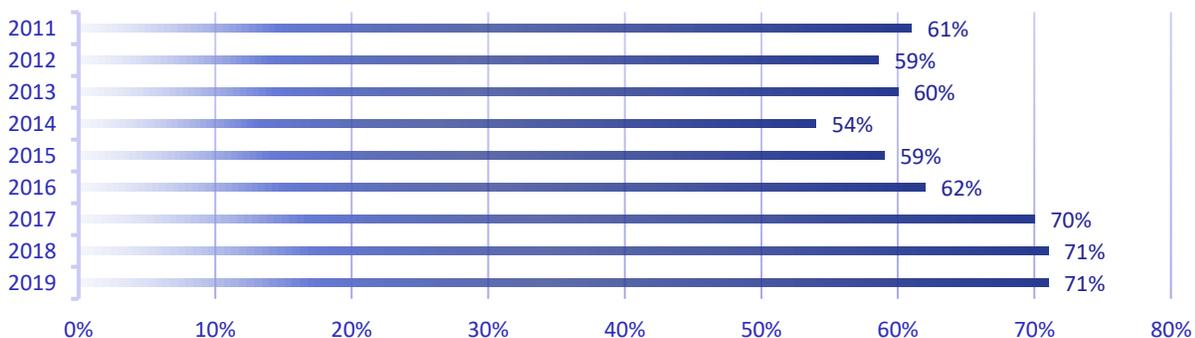
Homegrown applications in grants management were developed in house 18% of the time with 74% being vendor supplied. More than 30% of institutions do not plan on a major upgrade of their ERP for at least six years or more. Approximately 20% of the CIOs reported being in the process of upgrading financial, student, HR, payroll and advancement modules. Grants management upgrades are on a slower path with 26% on a 2 to 3-year upgrade plan.

In 2019, Ellucian was listed most frequently (68%) while Oracle/Peoplesoft was next with 31% and WorkDay was listed next at 7%. Shadow systems are still a campus reality. From 2010 to 2018, an average of 44% of CIOs felt there were fewer shadow systems than a few years ago, but 34% had about the same number and 11% stated the number was growing. Shadow systems are often an indicator of user dissatisfaction with their administrative application suite. In 2019, the level of importance of business process reengineering (BPR) dropped to 49% from 57% from the previous year for those considering it very important and those indicating BPR was somewhat important, moving from 44% to 35%.

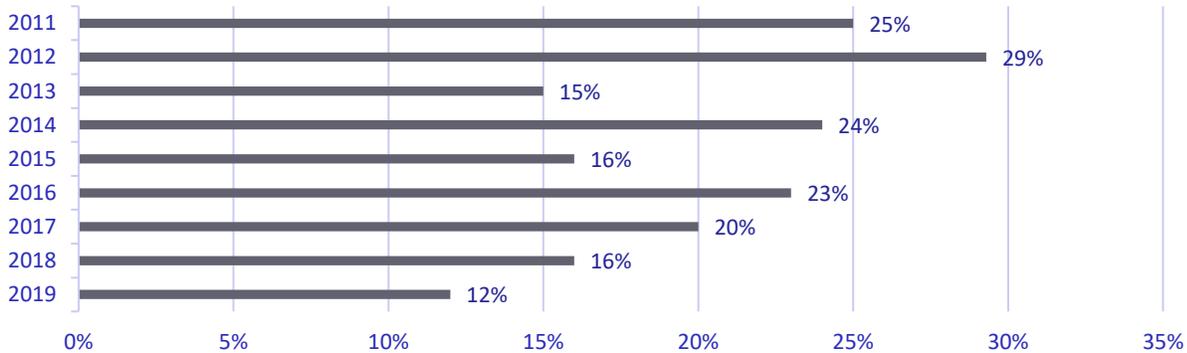
Academic Technologies

Over the last nine years, an increasing majority (71%) of Learning Management Systems (LMS) are vendor supplied with a significant drop in the percentage of open-source solutions in 2019 with only 12% contrasted with 25% in 2010.

VENDOR SUPPLIED LMS

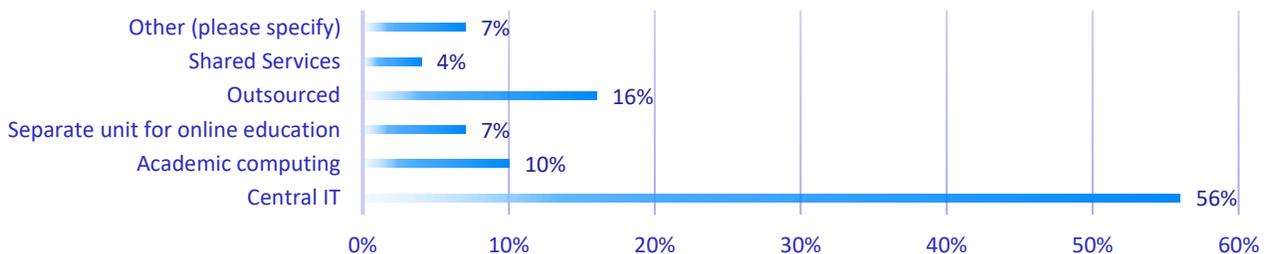


Open Source LMS



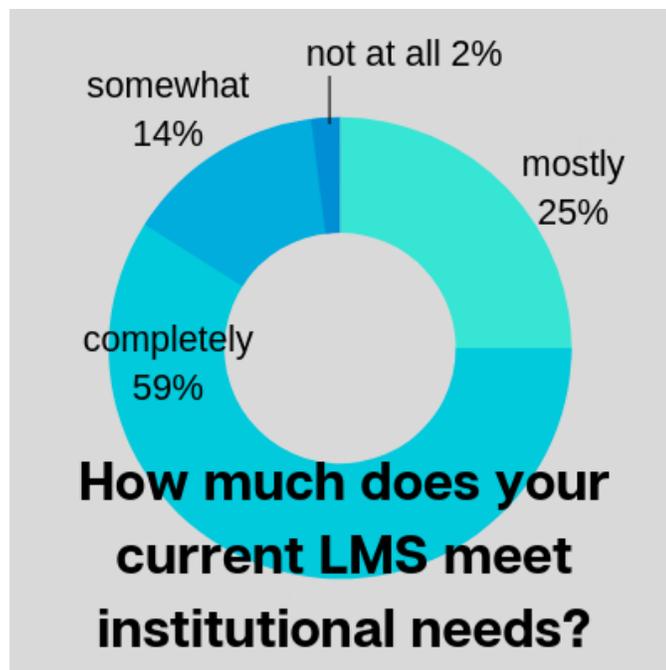
One possible explanation is that some users of the open-source Moodle software in 2010 shifted to a Moodle version through the partnership with Blackboard (which was severed after 6 years in 2018). Over the last ten years, Blackboard has been the dominant LMS, but increasingly loses ground each year. The high was 65% in 2010 to a low of 35% in 2019. Canvas has the exact opposite trend with a high this year of 33% up from 0% in 2010. Over the last nine years, an average of 62% of institutions have reported having the same LMS for more than five years and an average of 26% with two to five years. Replacing an LMS is difficult. It takes a great deal of time and money to switch, and faculty who are comfortable with an LMS are typically not willing to switch. In 2019, 33% of CIOs did not know when they would replace their LMS followed by 31% stating more than three years. Over the last seven years, there has been little change in the responsible units tasked with the maintenance of the LMS and related infrastructure.

WHO IS RESPONSIBLE FOR LMS MAINTENANCE AND SUPPORT (2019)?



On average over the past ten years, 57% of the time Central IT was the support unit (56% in 2019) followed by an average of 18% selecting to outsource (16% in 2019).

Since 2011, CIOs have increasingly moved away from being the unit responsible for online course design and reporting. In 2019, the provost (41%) or a separate unit devoted to online (19%) are now the responsible units.

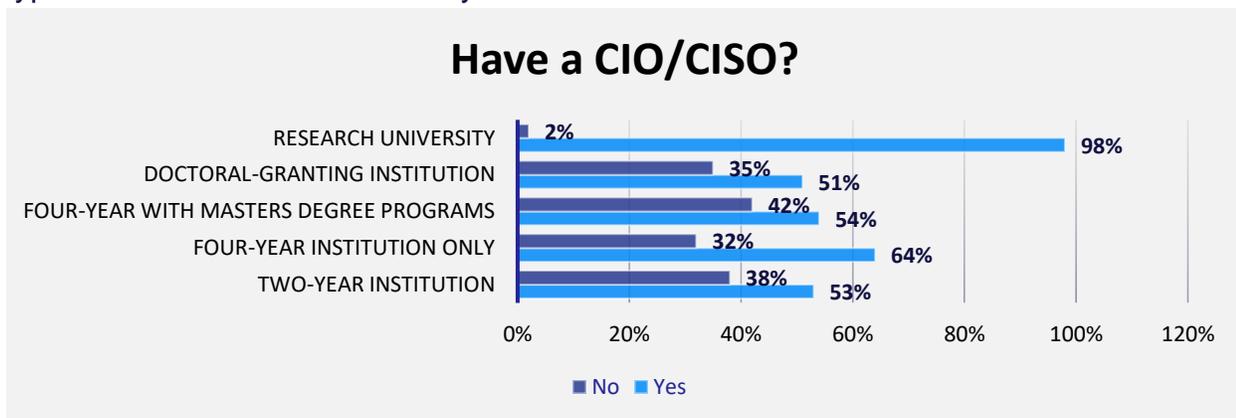


Most CIOs (59%) feel their current LMS is prepared to meet the academic innovation goals of the institution.

In 2019, 54% of CIOs indicated their current LMS allowed faculty to be mostly innovative with instructional design, with 34% with somewhat innovative. In 2019, 41% of CIOs felt virtual labs were easy to configure and support and 40% used virtual labs to provide access to online students. Desktop virtualization is losing some appeal over the last few years, from a high of 58% in 2016 to 49% in 2019. In 2019, 37% of CIOs are not using desktop virtualization at all. If desktop virtualization is used, VMware is most often used (79% in 2019 compared with Citrix at 27% and Microsoft at 17%).

Security and Infrastructure

Over the last ten years, there has been a steady increase in institutions naming a Chief Security Officer (CSO) or Chief Information Security Officer (CISO). In the latest survey, CIOs reported 65% have a designated CSO. Checking across the type of institution shows significant differences. Almost all research universities have a CIO/CISO while the other types of institutions are less likely to have one.



Historically, the CSO reported to the CIO (94%), but the latest survey shows a decline (90%) in reporting to the CIO and an increase (8%) in reporting to some other unit. A new survey question is, “Who on your campus is responsible for Information Privacy?” The CIO is the definite lead at 41%, but the CSO/CISO is second at 25%. Since most CSOs report to the CIO, ultimately the CIO has the major responsibility for privacy issues and concerns. However, in the other category, CIOs listed the Registrar’s Office and Legal Office several times. We will expand our look at privacy in the 2020 survey.

Over the last four years, an average of 73% of CIO’s feel security is more difficult to manage and protect against than in the past and 28% say it keeps them up at night. This year’s survey shows increases in both responses with 75% and 30% respectively. The 2019 survey showed a marked increase, 57% compared to 39% in 2018, of phishing attempts. CIOs are increasingly using training programs (77%) and policies and guidelines (73%) for managing and protecting against phishing attacks.

3 of 4 CIOs feel security has become more difficult to manage



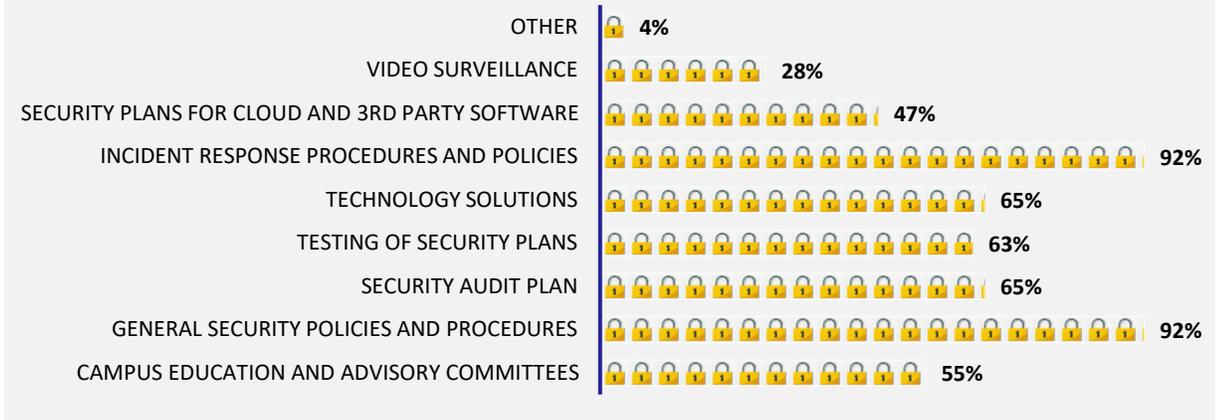
1 in 3 report that it keeps them up at night

The threat of ransomware attacks seems to be diminishing as 30% indicated ransomware attacks are getting worse, down from 45% in 2018, and 55% in 2017.

However, recent ransomware/malware attacks in higher education tied to the start of the 2019/2020 academic year have many higher education leaders concerned and this number may well change next year. In a recent article concerning the attacks taking place during the start of the academic year, Michael Corn—CISO for the University of California San Diego—said “It surely could be coincidental, but my gut is telling me it isn’t,” During the 2019 Fall LBCIO meeting, Michael Corn will lead a discussion that looks at these events and how best to protect against them. The increasing use of cyber insurance (76% up from 63% last year) is listed as the leading method for the management of ransomware. However, my gut check says this is not necessarily a good sign. A few years ago, I was asked to speak at a university in a very unsafe part of the world with heavy cartel influence over the area. The people who asked me to speak thought that I would be encouraged to know they would provide insurance in case I was kidnapped. I thanked them but politely declined the invitation. Cyber insurance seems a lot like that, you may be creating more attempts by letting the hackers know you have insurance to pay them for their efforts. On the other hand, many institutions want to do something, and this is a visible sign to constituents of their concern. Cyber insurance policies can provide institutions with protection for loss or damage to systems and data, loss of income or expenses needed for recovery, marketing support and notification support as well as ransomware payments.

Over the last ten years, an average of 79% of CIO's completed a security audit with an increase to 82% in 2019. The frequency of security audits over the last nine years has been mostly stable with an average of 43% doing an annual audit and 48% having one every two or more years. The 2019 survey reported 45% annual and 47% with two or more years. What has increased is external penetration testing from an outside firm. In 2011, only 55% of CIOs were using outside firms, by 2019 this number has increased to 71%. Similar trends exist for CIOs having formal security plans. In 2019, 62% have a plan and 12% did not have a plan compared to 2011, only 51% had a plan and 12% did not have a plan. Most CIOs (60%) update the plan annually. In 2019, security plans included general security and incident response policies and procedures 92% of the time.

What is included in your security plan?



In 2019, 96% of campuses are using video surveillance although only 28% include video surveillance in their security plans. Over the last ten years, an average of 78% of institutions

96% of campuses are using video surveillance



but only 28% include video surveillance in their security plans

had business resumption plans. The 2019 survey was similar with 79%, but 36% of the time the plan has not been tested. In 2019, 43% of the reporting institutions had a partial and 23% had a fully redundant data center where they could get all their systems up and running in less than a week. One of the largest security jumps has been in implementing a multi-factor authentication (MFA) solution for the institution. In 2019, 59% of reporting institutions had an MFA solution compared to only 11% in 2011. The increased services and support for security and privacy we have seen over the past ten years is very

positive. However, these added activities have a price tag; increased budget spend on security reflects these added activities. Since 2012, an average of 74% of CIOs increased the percent of IT spent on security over the previous five years.

Campus culture in supporting good practices toward IT security seems to be improving. In 2019, 63% had an excellent or good campus culture in supporting good practices toward IT Security. For instance, faculty and students are aware of their role in preventing various attacks. This is up from 52% in 2018. Faculty are increasingly agreeing that security policies and controls are necessary and must be followed with 46% agreeing in 2019

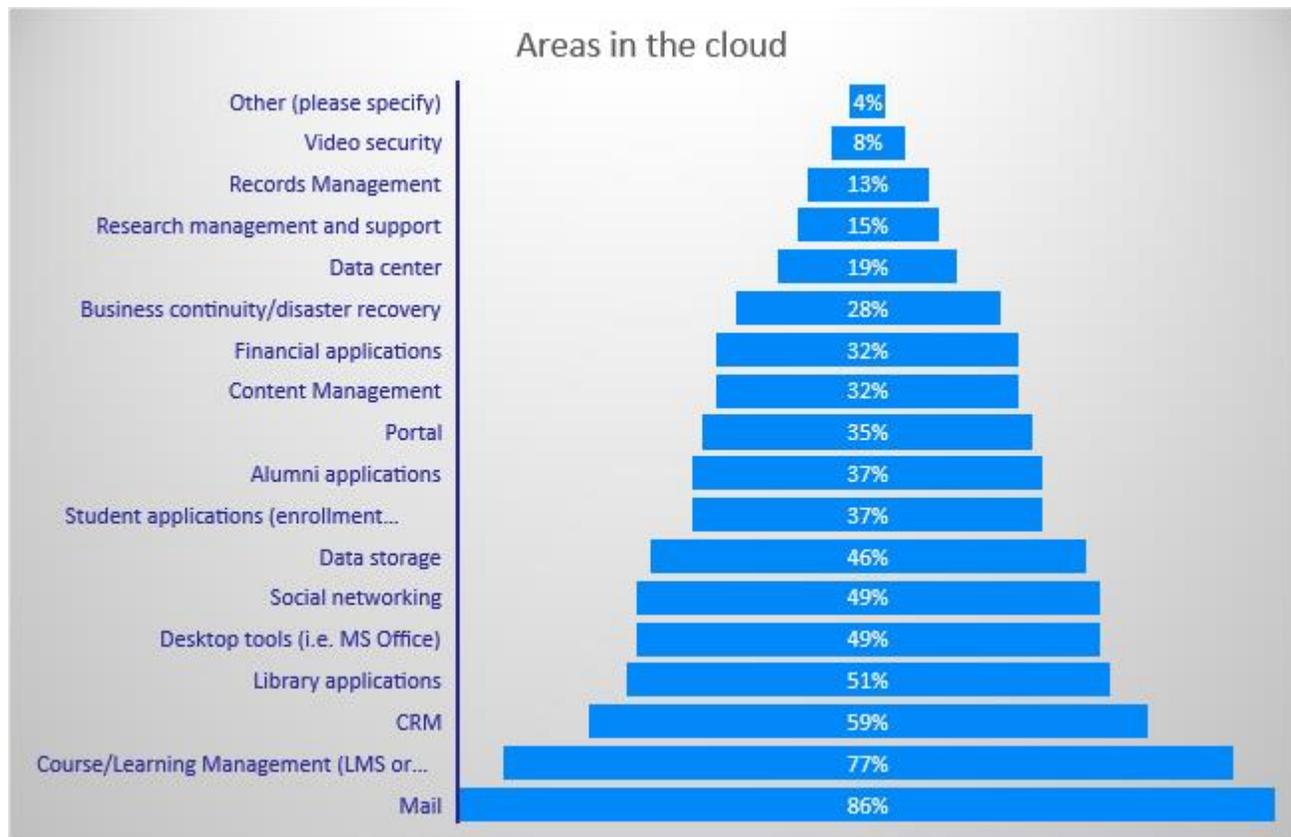


Since 2012, an average of 74% of CIOs increased the percent of IT spent on security over the previous five years

compared with 39% in 2018. Faculty complaints in extreme IT security and data safeguards impacting their academic freedom are improving. In 2019, CIOs reported faculty with 96% saying academic freedom is not being impacted or only somewhat impacted which is an improvement from 93% in 2018.

The Cloud, Big Data and Digital Repositories

Since 2012, the applications that are moved to the cloud have been consistent. In 2019, the top cloud applications are email (86%), LMS/CMS (77%), and CRM (59%). Financial, student applications, library, desktop applications, and the portal have all increased more than 20% since 2012.



The ERP (62% in 2019) is one application CIOs are increasingly considering moving to the cloud, while other applications have a negative trend including SaaS, IaaS, PaaS, data

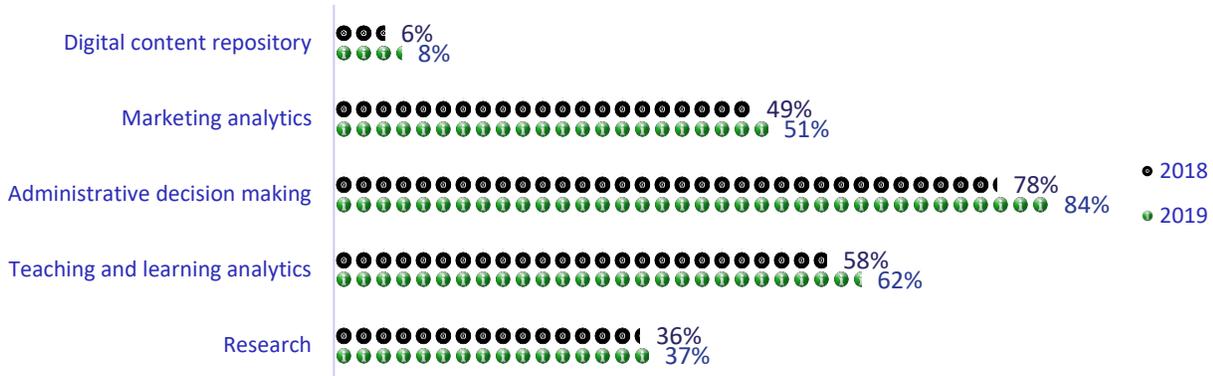
center, web development and a major decline in academic applications. As institutions continue to look for ERP upgrades or replacement, the cloud will be an obvious consideration as most of the ERP vendors in higher education are pushing the movement of administrative applications to the cloud.

In 2019, only 11% of CIOs have cloud policies and procedures that are strictly followed and updated regularly, while 37% have some policies that are strictly enforced. The majority (52%) either have no institution wide policies or are working on them. CIOs are increasingly using or considering Microsoft Azure (77% in 2019), while Amazon Web Services (AWS) dropped to 70% from 77% in 2018.

While Artificial Intelligence (AI) is a hot campus topic, most CIOs (37% in 2019) consider AI only somewhat important and only 26% consider it extremely or very important. Moreover, 37% said it was not important.

In 2019, 35% of CIOs had data analytics strategies and 35% were working on a strategy while 30% do not have one or are working on one. However, 86% of research universities either have a strategy or are working on one while only 52% of 2-year institutions have one or are working on one, while the rest hover around 70%. The use of data analytics is strong on campus with 84% using it for administrative decision-making and 62% for teaching and learning.

Institution's leveraged use of data analytics



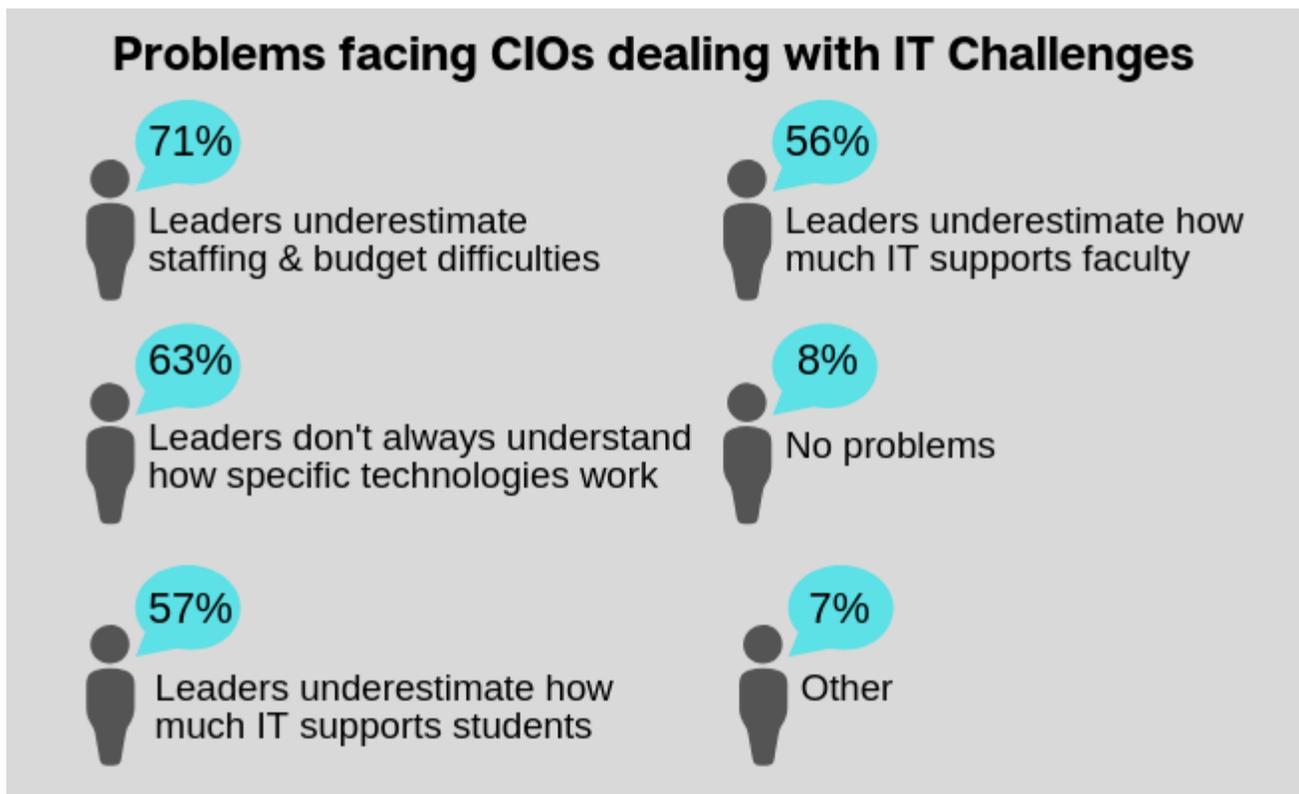
Big data impacts CIO's security concerns. The impact of big data on security has risen from 43% in 2013 to 65% in 2019. At the same time, the impact of big data on data storage, bandwidth, and support has been declining since we first asked the question in 2013.

Research universities overall seem to be affected most in all areas concerning big data. This makes sense because their storage and use of big data is typically much greater than less research-intensive institutions.

Since 2013, the use of digital repositories (DR) are on the decline with fewer institutions considering their use. In 2019, 51% had no DR. For those who have a DR solution, commercial DR solutions are the most popular (70%) vs 30% for open source.

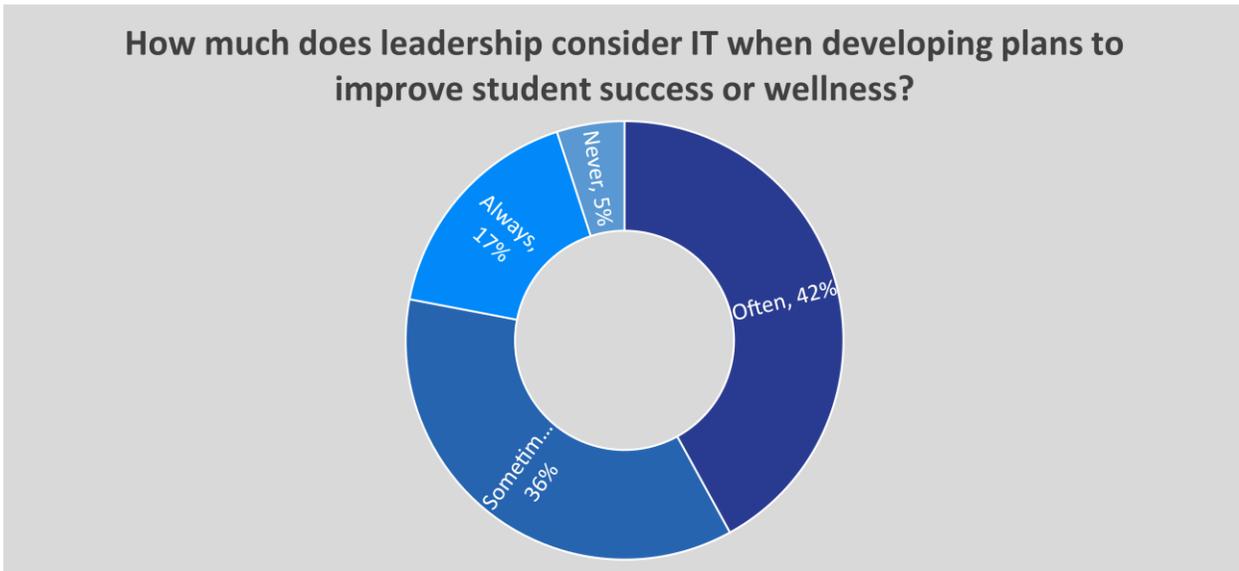
Leadership Issues

In 2019, 11% of CIOs believe that leadership (board of trustees, president, president's cabinet) completely understand the degree to which IT challenges impact the institution and its academic mission, while another 44% of CIOs felt the university leadership only somewhat understood the degree in which issues can impact their institution, 9% felt that they did not understand at all. The root of problems with leadership are depicted as follows:



Most problematic is the lack of underestimating of staffing and budget (71%), but on a high note, leaders are much less likely in 2019 than in 2018 to underestimate how much IT supports all of campus (66% in 2018 to 56% in 2019). IT infrastructure is considered crucially important (69%) to meet the campus strategic goals.

CIOs indicate that campus leadership **always** considers IT when developing plans to improve student success or wellness only 17% of the time and 5% **never** consider IT.



Does IT have a role to play in planning for student success?







Summary and Overview from Past Ten Years

We have seen many changes in both technologies and the way we manage and support the business of higher education during these past ten years. Below are some key points from our previous surveys for you to review and compare with this year's results. I hope you find them interesting.

2010: *“More institutions are expecting technology budgets to increase faster than inflation during the next five years, rather than to decrease... CIO’s who are skilled at building teams of knowledge workers across campuses to work on solving institutional problems and meeting needs will be viewed as true business partners to both administrative and academic departments. They will be invited and expected at the strategic-planning table. CIO’s who fail to market and educate institutional leaders and users and students on the real value and role of technology will end up as mere caretakers of infrastructure and be excluded from strategic or highly tactical planning.”*

2011: *“while budgets are still tight and CIO’s are concerned about the future, they are cautiously optimistic, and their planning reflects both optimism and concern. While the issues of consumerization are large and real, CIO’s are planning and adjusting their organizations to deal with the issues surrounding support for devices students, faculty, staff and others bring which are varied and new to IT. CIO’s are concerned about their organization and work is continuing on how best to build a governance model. Security remains an issue that is not isolated but tied to consumerization, cloud computing and future technologies being considered.”*

2012: *“Some key results: 1. VDI shows great promise in providing expanded services while cutting back on institutionally owned labs. 2. The use of shared services is expanding and will be worth watching in the future. 3. IT governance is not a passing fad, and more institutions rely upon their governance model when making major IT decisions. 4. The use of cloud and open-source computing continues to grow on campus, but growth is slower in the administrative applications area. 5. The need for more bandwidth continues, and gigabit to the desktop service is no longer just for the large research institutions.”*

2013: *“Budgets continue to remain tight as more than 60% of institutions report their institutional budgets decreasing or staying the same. Staffing continues to be an issue for many institutions as increased numbers of CIOs reported that their IT staff size decreased from last year... The consumerization movement or BYOD continues to grow, and 98% of CIOs report that consumerization is significantly or moderately affecting their institution. The growth in the use of cloud computing continues, but more with academic resources and applications than financial applications.”*

2014: *“While 85% of CIOs had a moderate to high interest in a CIO succession plan, only 12% thought their institutions would promote from within. This is important as we look at growing numbers of CIOs retiring. IT budgets remain tight even when institutional budgets are growing (43% indicated their institutional budgets had grown over the past year while 38% indicated their IT budgets had increased). Consumerization and BYOD impact is still important for CIOs and as one CIO reported “...the primary impact is on the consumer’s attitude. Their consumption of technology increases expectations and does not translate well when considering enterprise wide solutions.” While many CIOs talk about the need for changing the ERP model, plans for upgrading and/or replacing current ERP solutions with another ERP solution have increased as budgets show improvement. While wearable technologies are just beginning to hit the radar of CIOs, we expect to see more use of these devices and anxiety about their use from CIOs in the next five years. Campus standards for Course Management/Learning Management Systems (CMS/LMS) are changing and we believe consortial efforts and partnerships such as Unizin could bring even greater change in*

the next 3-5 years. Security issues are still important at most institutions and led the list of what CIOs believe they have to invest in during the next five years.”

2015: *“Only after the glow (or hype) of a new idea dims do organizations slowly begin the work of incremental and continual adoption. While some of the technologies included in this report (e.g., MOOCs) are passing their exuberant irrationality phase, most of the technologies are likely to see more significant, if not less raucous, advances. What goes quiet deserves our gaze. Analytics is one area of untapped potential. Even though universities still are hampered by insufficient data integration, many will continue to make progress in unifying sources of data, adopting analytic tools, and thus begin tapping into more complex analysis.”*

2016: *“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.”*

2017: *“This year’s survey continues to see security as the leading issue facing CIOs. CIOs in higher education are dealing with massive amounts of technical and cultural change. The role of the cloud has been moving forward, and over the past eight years of the LBCIO survey, administrative applications were not likely to be moved to the cloud. Data this year suggests that the wall is being broken down and more institutions are investing in cloud-based administrative applications. However, moving administrative and personal information to the cloud is not without concerns. One CIO from a large state system said “I have this feeling that once you do move an app to the cloud you are pretty much locked in.”*

2018: *“CIOs in higher education are dealing with massive amounts of technical and cultural change. The college or university of 2018 may have the same general mission of the college or university of 1968, but the management and delivery of services and support are radically different. As one CIO reported, “management needs to understand how complex and expensive existing and new technologies are, particularly with regards to security and compliance.” In 1968, many of the basic functions of the institution were reasonably well defined and the rules were spelled out well in documents like NACUBO’s book “College and University Business Administration” or CUBA, “the core reference work for all phases of higher education management.” (NACUBO is the National Association of College and University Business Officers) Today, NACUBO is working on another rewrite of CUBA, and the complexities are obvious when comparing the latest version with the earliest version published in the fall of 1967. Information technologies have been at the heart of many of those changes, and many of the changes would not have been possible without the rapid*

change in technologies. We expect to see even greater changes in the next fifty years, but at the heart of those changes will likely be new and advanced IT innovations.”

Summary for 2019

For 2019 our summary is not unlike those from previous years. While there are some significant changes and concerns, it is clear from our conversations as a board and our data that the role of the CIO in higher education is a difficult role and not getting easier. Managing ever-changing technologies, hiring and retaining key people who are in demand, trying to do more with less (I continue to find that the only thing I can do more with less is gain weight. I eat less but seem to gain more weight!), dealing with security and privacy issues that threaten the core mission of higher education makes the role of the CIO extremely difficult. Some of the concerns of higher education CIOs globally are reflected in the open-ended questions concerning what keeps them awake at night, listing obstacles to innovation and what technologies must institutions invest in for the future provide some insights into what lies ahead. Some quotes from CIOs that provide additional insights:

Paul Czarapata, CIO for the Kentucky Technical and Community College System: *“It has never been more important than now to invest in relationships across departments. Getting to truly know people, their interests, and what is important for their success is critical and will open the door to provide more influence when it comes to technology decisions.”*

Larry Conrad, CIO for the University of California Berkeley: *“There seems to be a trend that many higher education leaders see IT as important but not strategic, that is very concerning to CIOs. CIOs must actively work to be included in the strategic planning process. IT leaders aren’t powerless but have the opportunity and responsibility to educate leaders on the strategic role of IT. They need to be assertive to make sure leadership understands. Stop waiting to be asked. Common response there is no money, don’t ask.”*

Brian Nichols, CIO for the University of Kentucky: *“In this day and age, it is critical for the CIO to collaborate with University stakeholders and be a key partner across the enterprise so that technology investments are strategically made to improve services for students, faculty, and staff. IT is an agent of transformation and innovation now more than ever. “*

John Rathje, CIO for Kent State University: *“We need to focus on continual modernization, not just on digital transformation or optimization. We can’t do technology for technology’s sake but must build strategies to support our mission which incorporate technology. We must look at transforming people and processes not just the technology. It’s not about tools but about services”*

Vince Kellen, CIO for the University of California San Diego: “We are replacing 100% of our data warehousing and technology stack. We are doing it ourselves with minimal consultations. We are doing a lot with pre-planning to ensure we do the right thing. You can spend 30 million on consultants to do the project or 1 million to help plan to do it ourselves. In 30 years’ time we haven’t gotten better at business solutions in higher education. Young people building plans develop teamwork and understandings. Collaboration has to be strong, but it pays off for the future.”

James Bradley, CIO at Trinity University in San Antonio: “If you are in the CIO role you need to plan to retool your skills every 5-10 years. Big ideas change regularly, what was big 5 years ago is old hat today. AI needs good, scrubbed, clean data. AI is only as good as the data. There is always something new and we need to think not only about the new things coming forward but how to build/train the organization to handle and manage them.”

Nelson Vincent, CIO at the University of Cincinnati: “Build relationships with clients and peers. Grow them and keep them... Strategic planning is critical, but we have a lot to do, we have a great opportunity to communicate and teach through the strategic planning process.”

Rod Tosten, CIO at Gettysburg College: “Need to establish trust. IT can’t operate as an isolated organization. It’s not what people tell you that will hurt you but what people do not tell you that will hurt you. When they’re talking with you, they are willing to work with you.”

Kendra Ketchum CIO at the University of Texas at San Antonio: “The greatest difficulty in the role of the CIO is leveraging the human capital in a way that provides the best utilization for the business of the university. We need to address and execute on the aligning IT with the business and academic needs of the university.”

Bob Wisler, Director of IT/CIO at Northwood University: “Finding and keeping good people are the keys to a successful IT organization. You almost always can teach technical skills, but the quality of the person matters both in supporting the business and building a team... And because technology is always going to change faster than you can provide training, an agile staff will be required to keep moving forward at warp speed. But the good news is that all of the change that takes place in our sphere of influence continues to make IT one of the best places to work at a university!”

Loretta Early, CIO at George Washington University: *'my advice would be to embrace the industry you serve, i.e., higher education. My epiphany came when my mindset changed from being an IT Leader that just happened to work at a university, to being a Higher Education leader that just happened to have IT as my area of focus. I would add that in order to be trusted, one must start from a position of trust.'*

Brian Cohen, CIO for the City University of New York System: *"It is tremendously valuable to have 10 years of higher ed IT trends, challenges, and investments documented in one report. Seeing that other CIOs share the same issues and developments as I do validates my experiences and proves the real importance of the LBCIO."*

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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