CAMPUS TECHNOLOGY

Innovation in Education

Higher Education All-In on Cloud-First

When digital transformation is the destination, all roads lead through the cloud. Here's how colleges and universities can plan their own cloud journey, leverage cloud computing capabilities to meet growing student and administrative demands, and achieve true innovation, agility, collaboration and personalization.

Achieving Digital Transformation through the Cloud

Institutions find themselves at different points on the cloud trajectory, balancing mission-critical priorities and ROI from cloud solutions.

IS DIGITAL TRANSFORMATION IN higher education possible without the cloud? Not likely. When that transformation is viewed as a journey, not a destination, the essential role of cloud-based resources as enabling and empowering infrastructure comes sharply into focus.

A recent survey of *Campus Technology* readers reveals just where some institutions now find themselves on their own cloud journeys, and what objectives remain. Respondents' level of cloud reliance and maturity varied, but when asked in what strategic areas the cloud had yet to be leveraged, "none of these" was the top response (33.8%). Asked to name the one strategic area they've transformed or advanced the ***most*** thanks to cloud capabilities, 31.2% of respondents cited data management; 24.7% referenced hybrid work/learning.

STRATEGIC AREAS IMPROVED THROUGH THE CLOUD

45.5%	Data Management	40.3%	Hybrid Work/Learning
35.1%	Administration Efficiencies	32.5%	Data Analytics/Reporting
26%	Cybersecurity	26%	Student Engagement

How colleges and universities establish their cloud models and use cases varies widely, with R1 institutions leading the way as far as variety and approach, yet the building blocks and foundational principles for cloud use remain largely the same, regardless of an institution's size or cloud maturity. When embarking on any new cloud project the first question IT and higher education leaders must ask themselves is, what do we want to achieve?

Institutional performance, operational efficiencies, student success — the primary goals of digital transformation in higher education today — would not be possible without the agility and scalability available only through cloud-based computing and resources.

Getting There

Without a clear strategy in place, digital transformation and cloud migration can start to look like a game of whack-a-mole, where initiatives are undertaken piecemeal without connection to a broader, holistic mission — or worse, undertaken only in response to an emergency or challenge as outdated infrastructure or solutions fail. One of the main

drivers of higher education's march to the cloud – the need to make sense of massive amounts of data to improve student engagement and outcomes – in many ways remains elusive.

In unveiling **the Top IT Issues for 2023**, Educause acknowledged leaders' ongoing challenges as they undertake the complex, multi-year work of digital transformation:

"Many institutions are working to address such issues as enrollment, affordability, and graduation rates and to improve areas such as decision-making, staff engagement, students' success, and diversity. Ongoing structural challenges can make this work more difficult and expensive. Data is often siloed, but the questions leaders need data to inform transcend the siloes…scaling solutions across the institution, or beyond it, by adopting cloud services could increase efficiency, but many existing processes or locally developed technologies don't easily lend themselves to off-the-shelf solutions."

As part of the ***Campus Technology*** survey, respondents were asked to name the cloud-based capabilities or infrastructure their institutions plan to adopt or roll out in the next two years. "Infrastructure management" topped respondents' list at 35%, followed by "backup and recovery" (32.5%), "data management" (24.7%), and "network monitoring" (22%).

AI/ML Knocking at the Door

Just as COVID-19 and the ongoing global pandemic forced overnight transformation of on- and off-campus computing maturity, the need to leverage artificial intelligence and machine learning capabilities represents the next tsunami crashing over higher education. As teams weigh where cloud solutions will take them next, understanding and articulating the need to include data-intensive computing, security, reporting, and analysis is imperative. That's all the more true as students increasingly demand a level of personalization and engagement that can only be delivered through a robust analytics and data infrastructure.

"Institutional decision-makers can no longer afford to fall back on what they think they know," Educause panelists wrote as part of the association's **Top 10 IT Issues: 2023: Foundation Models.**" This new endemic world is going to be drastically different from the pre-pandemic world, and as a result, higher education needs to continue to evolve. Analytics is one of the more important tools to help leaders and decision-makers understand how well they are operationalizing new strategic initiatives and how effective those initiatives are. Institutions implement a variety of analytics programs that are foundational to both short- and long-term decisions made by institutional leaders. But it's time to grow beyond today's analytics programs and to mature them for endemic management and strategy."

31%

of survey respondents said **DATA MANAGEMENT** is the one strategic area their institution has transformed or **ADVANCED THE MOST** thanks to cloud-based capabilities.

That's only possible through the cloud, and all the latest and greatest computing and analysis power third-party cloud vendors invest in and deliver to their customers.

Cloud Budgets Keep Growing

Here's where industry and education plan to invest cloud dollars, and SaaS leads the pack.

HIGHER EDUCATION IS NOT ALONE when it comes to increasing spend on cloud technologies: Gartner predicts end-user spending on public cloud services will top $591 billion in 2023, up from $490.3 billion in 2022, an increase of 20.7% year over year.

"Cloud computing will continue to be a bastion of safety and innovation, supporting growth during uncertain times due to its agile, elastic, and scalable nature," Gartner VP Analyst Sid Nag said **in a release announcing the forecast**. "Cloud spending could decrease if overall IT budgets shrink, given that cloud continues to be the largest chunk of IT spend and proportionate budget growth."

"As higher education institutions continue to **pivot toward continuous modernization** practices, the SaaS segment of the cloud is likely to see the most investment," noted Damien Eversmann, chief architect for Education at Red Hat. "Cloud resources provide the agility and flexibility needed to support the culture of change that continuous modernization demands. As long as security practices are properly maintained, cloud adoption is one of the best tools for academic institutions to stay ahead of the curve."

All cloud categories are expected to see growth in 2023:

Worldwide Public Cloud Services End-User Spending Forecast (Millions of U.S. Dollars)

	2021	2022	2023
Cloud Business Process Services (BPaaS)	54,952	60,127	65,145
Cloud Business Process Services (BPaaS)	89,910	110,677	136,408
Cloud Application Infrastructure Services (PaaS)	146,326	167,107	195,208
Cloud Application Services (SaaS)	28,489	34,143	41,675
Cloud Management and Security Services	90,894	115,740	150,254
Desktop-as-a-Service (DaaS)	2,059	2,539	3,104
TOTAL MARKET	**412,632**	**490,333**	**591,794**

BPaaS = business process as a service
PaaS = platform as a service
IaaS = infrastructure as a service
SaaS = software as a service

Note: Totals may not add up due to rounding.

Source: Gartner (October 2022)

What's Next for Cloud?

In higher education, where data is king, continuous modernization is an essential approach for IT leaders, and cloud computing's potential is limited only by reluctance to embrace it.

DAMIEN EVERSMANN
Chief Architect for Education, Red Hat

AS SO-CALLED WEB 3.0 TECHNOLOGIES and their potential in higher education shift into greater focus, the cloud's necessity as a ubiquitous foundation for learning only grows. ***Campus Technology*** recently spoke with Red Hat's **Damien Eversmann**, chief architect for Education, a former software developer and veteran of higher education high-performance computing research, who says fostering a culture of change is the first order of the day when implementing any cloud strategy. Beyond that, cloud's potential is boundless.

When we talk about continuous transformation and how the cloud enables that, what are the key elements that ensure continuous modernization? What is required to make that successful?

EVERSMANN: There's a lot of talk about continuous modernization or continuous innovation, or whatever title you want to put on it, but it's about "culture first." Culture is the most important thing. We can talk about the cloud, the tools, processes, and all of that, but in the end, if you haven't built a culture that is willing to accept the constant change that comes from continuous modernization — and not only accept it but really drive it — then you're not going to be successful.

Assuming we've fostered a culture that is willing to accept constant incremental change, there are really three things to keep in mind when you want to adopt this approach. First, standardization. At Red Hat, we like to call it a "standard operating environment." There are tons of tools out there that do anything and everything, and tons of ways to write and deploy applications, but at the base you need to build a standard environment that everybody who develops or buys or procures tools understands. Whether that's "We deploy everything on Linux," or "We deploy everything in Python," you need a common and accepted starting point and that's a standard operating environment.

After that, modularize everything. Containerize everything. You don't want these huge monolithic projects because it takes a lot of time to move them, change, improve, or update. Modularize everything. Build small tools — ideally, the smallest functional piece you can — to make it easier to update or fix that piece if there's a problem with it, or reuse that piece somewhere else.

Third is automation. Continuous modernization requires doing a lot of things repetitively. Developers have done this for decades — CI/CD, continuous integration/continuous deployment — and the idea is that we build tools so that every

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>
> – DAMIEN EVERSMANN, RED HAT

time I update a little piece of code over here, it automatically gets built and tested and all of that over there. I don't have to do that manually every time. If we constantly tweak and change a thing, we need to make sure we're not breaking something else. But if my job after I've tweaked over here is to go test everything else and make sure I haven't broken it, I'm never going to get anything else done. That repetitive testing or process that I built into it needs to be automated. If you can do those three things, you're well on your way to continuous modernization.

As the cloud becomes more ubiquitous and empowers all levels of users to do things they couldn't do before, do you find that's enabling a shift in acceptance?

EVERSMANN: It's a double-edged sword for education. Every academic IT department has this nagging fear in the back of their head that somewhere, a clinical researcher stood up something in the cloud without asking or telling, and now patient data is sitting out there, unprotected, and my entire institution is at risk if something goes wrong. That's the dangerous edge of the sword; but the useful edge of the sword is that it speeds things up and makes things a lot easier to do. At Red Hat, we're working to create cloud environments that benefit researchers in data science. Whether you're a researcher at an academic institution, or a data scientist at a marketing firm, the tools that data scientists and AI/ML researchers use are changing, literally as they're using them. To maintain an environment where I am constantly able to use the latest updated tool on prem is nearly impossible. The only people who can do that at any real scale are the cloud providers.

What needs to be in place to make the most of the cloud's agility and flexibility?

EVERSMANN: It all depends on how renegade you're willing to be. I can log in to AWS and stand up an entire AI/ML research environment in an afternoon, and as long as I'm willing to keep

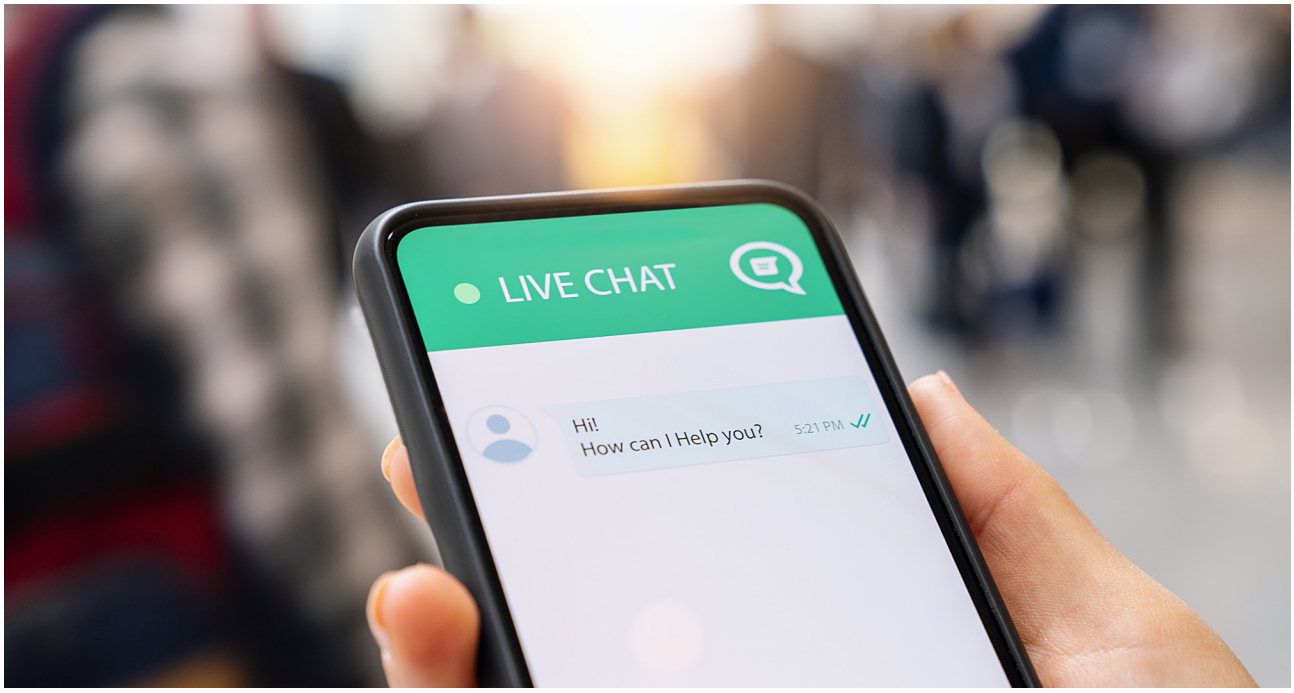
swiping my credit card and keep ignoring security risk, then this is an easy thing to do. Where institutions and enterprises and government agencies have struggled for years, and they still do, is cost control. It's easy to have unlimited power and infinitely up-to-date resources as long as I don't care how much it costs, so you start to balance that. The same goes for security, and that is where the culture piece comes in: If we all know what tools we're using, as long as we're happy with those tools we can make sure as a team to keep them secure.

What's possible today that wasn't possible three years ago thanks to the cloud?

EVERSMANN: Have you played with ChatGPT? It's eye-opening, the level the technology has gotten to. It's also downright frightening. I have a background in software development, and I've sat down with ChatGPT, gave it a problem statement, and it wrote executable source code to solve the problem. Is it super huge and complex? No, it was simple source code, but it's changing the way we approach problems. ChatGPT, while it does sort of maintain a context, I don't think it could maintain the context of a full enterprise software solution. But my developer who's writing a module might be able to make huge use of that, iterate back and forth, and then bring it into their workspace and polish it. That concept of jumpstarting the solution is brand new, and one of the things that makes it so frightening to a lot of us in IT is that we have no idea where we are on the S curve of adoption yet. Who knows if these tools are going to be able to do those full enterprise builds in five years.

Ten years ago, people perhaps had similar concerns about cloud-based infrastructure.

EVERSMANN: There's one big reason ChatGPT and tools like it could only exist today. When you're building out machine learning tools, they need to be trained. They need to learn, just like you and I need to learn; they're just really fast at it. What enabled the researchers who developed



ChatGPT, and the IBM researchers who developed things like Watson, to really start building usable tools was the huge amount of data they could use to train them. That amount of data didn't exist before the cloud. There was no way that any one organization could leverage that volume of data until that volume of data existed in one place.

Higher education is on the forefront of just about everything. If you look at Red Hat, we are the biggest open source company in the world, but we got that from higher ed, from the MITs and the Stanfords and the Berkeleys of the 1960s — that's where open source came from. When we talk about pushing the envelope, it's always been about higher education. Sometimes that's to their detriment, because higher education is also one of the biggest targets of ransomware, but at the same time education needs to understand that that's their job. They've set themselves up to be at the forefront of just about everything, and that's why all of the researchers want to go to universities instead of someplace else, because it's where all of the cool new ideas come from.

When you talk about data and the cloud, one common topic is the democratization of data, and the fact that everyone has access to the data now, and anyone can draw their own conclusions from it. The moment the Hubble telescope captures a new image, it's available to researchers around the world immediately. That's one of the things that only the cloud brought to us, this ability to disseminate knowledge instantly.

The security concerns hold everyone back, and that's why the whole culture piece is important. Everyone needs to understand these tools are very powerful and if they're not used properly, if we don't put the proper controls in place around our data, if we don't put the proper security measures in place and do the extra work, then someone on the wrong side of things will use those tools against us. At this point the advantages hugely outweigh the risks. You just need to go into it with eyes wide open and a well-defined plan. If you've got that and a culture for security, you're off to a great start.

Abstract Beauty: Cloud Reshapes Research in Higher Ed

Abstraction and flexibility provide advantages to higher education beyond digital transformation, especially for data-intensive research.

WHILE THE MISSION OF HIGHER education has never changed, the means of fulfilling that mission continue to swiftly evolve, particularly as a result of cloud computing technology and the migration of workloads, applications, storage – pretty much everything – to the cloud.

One of the great advantages of the cloud is that you can build out very tailored capabilities designed around a single project or effort, allowing you to build flexible, context-aware policies around data management, data loss prevention (DLP), configuration management, and more, while staying out of the users' way. The cloud also allows you to grow this over time, without making big financial investments on the front end.

– HUNTER ELY, PALO ALTO NETWORKS

Higher education research, in particular, enjoys many benefits from the cloud, including rapid provisioning of data and applications, or abstraction, which ensures non-technical users can readily deploy cloud resources and quickly get back to the real task at hand: research.

"Infrastructure needs to be, in the words of my old CIO, 'abundant,'" said Hunter Ely, a security strategist with Palo Alto Networks. "What that really means is that the infrastructure needs to be fully supportive of the higher ed mission. You need an architecture that is designed around visibility and flexibility."

None of that requires security to take a back seat to user convenience or control. On the contrary: Cloud computing ensures IT can maintain strict compliance and customize access while offering users as much agility and flexibility as their research demands.

"You can design and build logical workspaces rooted in a zero-trust mindset, which are easy for those users to access but still provide the controls you need for compliance and security," Ely said. "One of the great advantages of the cloud is that you can build out very tailored capabilities designed around a single project or effort, allowing you to build flexible, context-aware policies around data management, data loss prevention (DLP), configuration management, and more, while staying out of the users' way. The cloud also allows you to grow this over time, without making big financial investments on the front end."

More than Transformation

Cloud is at the heart of institutions' ongoing march to digital transformation, but that's not all: Prompted by the pandemic, many colleges and universities have also embraced the rapid adoption of cloud capabilities in support of remote work and collaboration.

According to Jan-Martin Lowendahl, a VP analyst at Gartner, the pandemic and shifting economy "have complicated how education institutions provide a quality education experience."

"As higher education CIOs plan their educational agendas for the coming years, they can look to the immediate past to find a potential blueprint for the future," Lowendahl wrote in a recent **Gartner report**. "Change and the ability for higher educational institutions to pivot quickly and adapt in an agile manner are becoming the 'new normal' way of fulfilling the institution's mission."

He recommended that higher education CIOs involved in digital transformation should "establish iterative development as the default approach by identifying the minimum viable components that improve composability … and reduce the risk of incurring technical debt."

Gartner's 2022 CIO and Technology Executive Survey revealed that nearly half of higher education respondents looked to increase investment in cloud platforms in 2022, second only to increases to investments in cyber and information security.

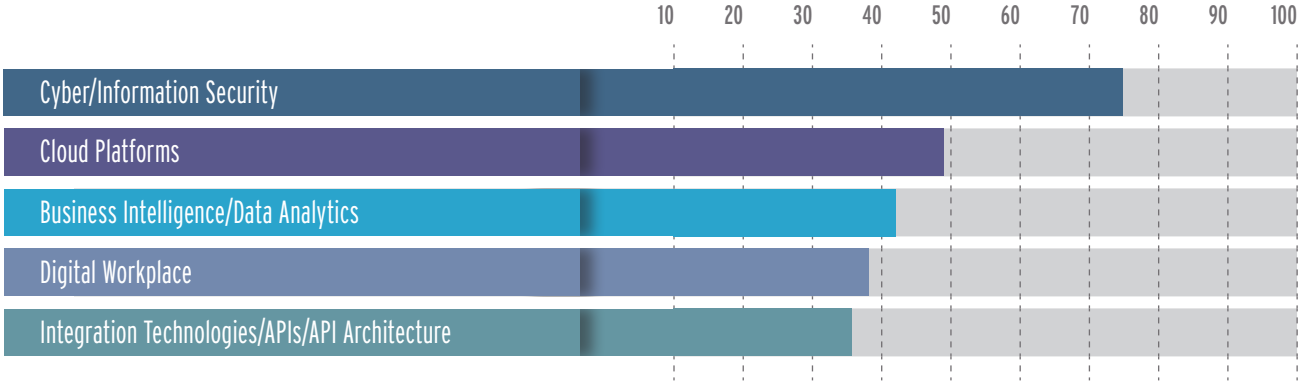
The race to the cloud "has been driven by both the remote workforce changes and a need to smooth out budgets through op-ex activities instead of large, infrequent capital expenditures," Ely said. "There is another huge push to a cloud delivery model, which was happening regardless of the pandemic, but it has allowed institutions to reprioritize activities to focus on larger system upgrades and cloud migration."

"Organizations need to be able to access their applications and data from anywhere, at any time," added Mathew Lamb, manager of pre-sales of cloud native solutions at Palo Alto Networks. "And organizations that were previously hesitant to move to the cloud have been forced to do so to support their remote workforce."

No matter what factors are behind an institution's cloud journey, research ultimately benefits from what the cloud has to offer: virtually unlimited storage capacity that's scalable, as well as the ability to store and manage increasingly large data sets easily. Researchers can access more powerful computing resources to process all of that data, whether structured or unstructured, thanks to the cloud, which delivers complex data analysis capabilities and data warehousing solutions. Applications and analytics platforms provide a wide range of tools that also make it easier for researchers to analyze and visualize data, including machine learning and predictive analytics. These cloud-based capabilities have become non-negotiable essentials for moving research forward in higher education.

Top 5 Areas of Technology Investment in Higher Education

Source: 2022 Gartner CIO and Technology Executive Survey



HUNTER ELY
Security Strategist, Palo Alto Networks

MATHEW LAMB
Manager, Pre-Sales Cloud Native Solutions, Palo Alto Networks

Essentials for Navigating Cloud Implementations

Whether your institution's move to the cloud is part of a pandemic response, an overall digital transformation effort, or other strategic initiative, here are key factors to consider.

CAMPUS TECHNOLOGY RECENTLY spoke with **Hunter Ely**, security strategist with Palo Alto Networks, and **Mathew Lamb**, manager of pre-sales of cloud native solutions at Palo Alto Networks, to discuss the cloud imperative in higher education research and digital transformation.

What do colleges and universities need to know about the latest developments in cloud offerings?

ELY: Institutions generally made huge investments over the last couple of decades into fiber infrastructure. In many cases, cloud projects are driven by individual needs, not a changing philosophy on maintaining data centers or reducing network spend, so many are learning about cloud offerings as needs arise. That said, there are many interested parties on campuses that are moving to SaaS or cloud services without considering how that works in the existing infrastructure. It's imperative that colleges consider how to grow their cloud investments while maintaining holistic visibility across all assets, rooted in a zero-trust methodology.

LAMB: As cloud-based solutions become more available, institutions can reduce the costs associated with maintaining and upgrading on-premises IT infrastructure. Cloud providers offer a range of pricing options that can reduce capital expenditures and allow institutions to operate more efficiently. Providers also offer scalable resources that can be adjusted to meet changing needs, without having to invest in new hardware or software. The cloud also offers a high degree of flexibility, and allows institutions to easily integrate new technologies and workflows into their existing infrastructure, stay current with the latest advances in technology, and remain competitive in the ever-evolving higher ed landscape.

In what ways have security mandates changed or evolved?

ELY: The Cybersecurity Maturity Model Certification (CMMC), NIST 800-207, Presidential Memorandum 14028, and other efforts make security front and center in any activities that use federal data, grant data, or other sensitive personal or research data. Many federal grants now require a security plan along with the grant proposal. That's seismic in how it affects the research and education community.

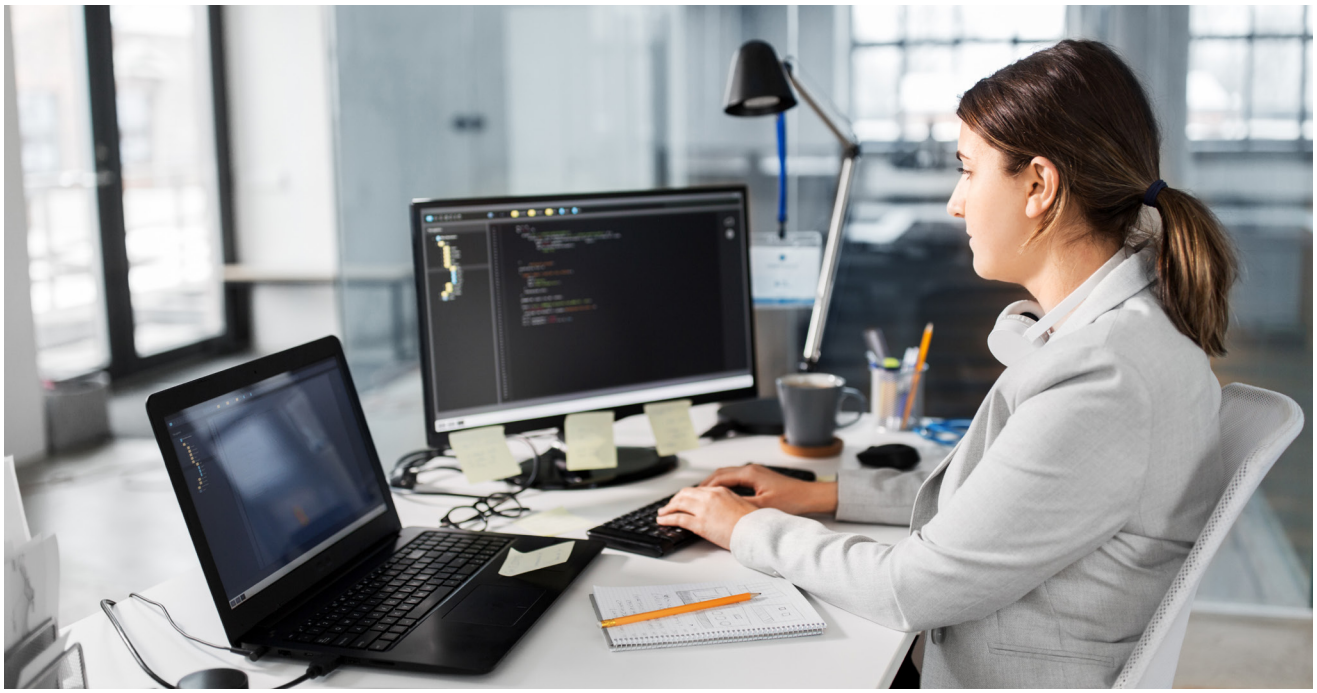
LAMB: Since the COVID-19 pandemic, security mandates have become even more critical as remote work has increased and a larger proportion of sensitive data and systems are now accessible from remote locations. Key elements of a modern security approach for cloud include multi-factor authentication,

encryption, secure configuration management, real-time monitoring and response, and threat intelligence. It's also essential to ensure that security measures are integrated into the overall cloud migration strategy, including procurement and vendor selection, infrastructure design, and day-to-day operations. The appropriate mix will vary depending on needs and risks of each organization, but the goal should be to implement a robust, multi-layered framework that protects against internal and external threats.

ELY: The cloud is being used in nearly every institution we work with. In many cases, that's centered around digital transformation — a changing service delivery model of ERP, student information systems (SIS), or learning management systems (LMS). That doesn't change the fact that the data used in those systems requires a security strategy for cyber threats and compliance. The upshot is that looking at security as a holistic platform question in those contexts is more easily segmented and protected while remaining part of a larger ecosystem of services. Security is front of mind for our customers when it comes to moving to the cloud, because they have an opportunity to build something new with security and compliance as an integrated part of the project instead of a bolt-on after the fact.

What are the biggest challenges for higher education around the cloud?

LAMB: Security, compliance, integration, cost, and technical expertise. Ensuring cloud provider compliance around sensitive information and compliance with regulations such as the Family Educational Rights and Privacy Act (FERPA), which govern the handing of student data, can be challenging. Integrating cloud technology with existing systems and processes can be a time-consuming process. Institutions need to carefully plan and execute the integration to ensure they meet their goals and requirements. And the cost of cloud technology can be a barrier for some,



especially those with limited budgets. Institutions need to carefully evaluate the costs associated with different cloud solutions to ensure they achieve value for their investment. Migrating to the cloud requires significant technical expertise, which may not be available in house. Institutions may also need to invest in training and support to ensure that their staff are equipped to effectively manage and use cloud-based solutions.

ELY: Scale and scope are some of the primary challenges facing institutions looking at cloud transformation. Universities often serve large populations, which makes the financial analysis of moving to the cloud difficult and potentially expensive. Things like security can be de-prioritized in an effort to reduce total costs. It's important that institutions don't "value engineer" their cloud investments, because the risks are just too high from a threat perspective.

What questions should institutions ask of their industry partners?

LAMB: Focus questions in seven key areas, around security, reliability, scalability, integration, cost, support, and flexibility. Ask what security measures are in place to protect sensitive information, such as student record and research data. How does the partner ensure compliance with relevant regulations and standards?

What measures are in place to ensure system reliability? How does the partner's solution scale to meet changing needs and demands? What resources and support are available for growth and expansion? How does the partner's solution integrate with existing systems and processes?

What are the costs association with the solution, both upfront and ongoing? What level of support and training is available for both technical and non-technical staff? Does the partner offer flexible and customizable solutions, or are they limited to a set of predefined offerings? Does the partner or tool offer flexibility to operate across cloud service providers?

Perspective Shift: Building a Culture of Cloud in Higher Education

As colleges and universities increasingly move to the cloud, acceptance among the campus community also grows.

MARCH 2020 FOUND MOST industries scrambling to shift core capabilities and workloads immediately to the cloud in support of remote work and data management, and maintaining some semblance of normalcy when the reality was anything but.

Today, higher education IT professionals refer to "the new normal" when discussing the many modes of learning, research, and other day-to-day hybrid work now possible thanks to cloud computing. The monumental movement and general acceptance of the cloud within higher education happened nearly overnight, after years of hesitance and reluctance on the part of higher ed leaders who sought greater on-site control over data and operations. That reluctance transformed to trust as cloud-based operations proved their mettle, and institutions by and large today embrace a new way of working through the ongoing and continuous change of digital transformation.

"That's probably the biggest change – that change ***is*** the constant," said Bill Greeves, an industry advisor for SAP who supports the organization's education customers. As a former CIO and deputy county manager for Wake County, N.C., Greeves saw firsthand the overnight transformation to cloud-based workloads to keep

government and citizen services up and running at the onset and throughout the pandemic.

For higher education, Greeves said, "cloud now seems to be the general solution because it gives you that ability to be more modular in your approach, more rapid in your deployment, and more flexible in the how and where and what you want to accomplish. Everyone I talk to in the higher education space sees the value, for sure, but there are many stops on continuum of getting there."

Drivers of Change

In March 2021, ***The Chronicle of Higher Education*** surveyed senior higher education leaders and revealed that of 665 participants, 54.3% were in the cloud already and 63% expected cloud service adoption to increase. Respondents predicted that 68.6% of their applications would be in the cloud by March 2023.

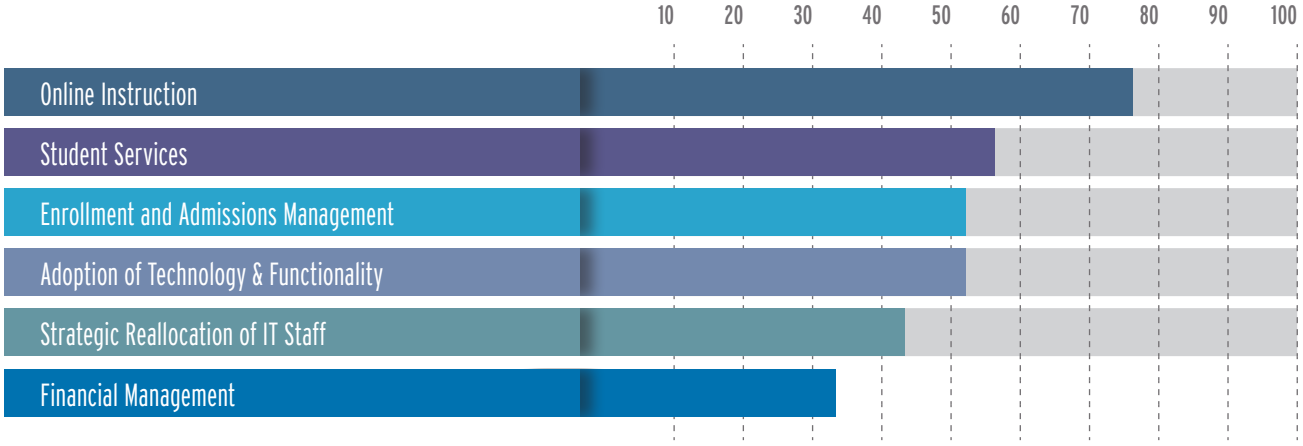
"Senior leaders overwhelmingly said cloud-computing services have been valuable in responding to institutional needs (96%), which aligns to growth being seen in cloud adoptions industry-wide," a **press release announcing the survey results** stated.

Leaders said the top areas where cloud-based capabilities would most benefit operations included online instruction (cited by 76% of respondents); student services (56%); enrollment and admissions management (52%); adoption of the latest technology and functionality (52%); strategic reallocation of IT staff (43%); and financial management (33%).

Given the reliance on cloud-based technologies and applications to advance so many elements of institutional missions, another pandemic result finds more CIOs and IT leaders with a seat at the table, according to the ***Chronicle*** survey. Eighty-six percent of survey respondents reported that the pandemic has required closer collaboration between senior administrators to make strategic decisions about technology. A fully 75% expected that collaboration to continue post-pandemic.

"It's not just the pandemic." Greeves asserted. "It's also the other things that happened as a result of the pandemic, like the workforce shift and the Great Resignation. It's been this confluence of different events, but collectively these occurrences expedited digital transformation efforts across the board and that's a monumental shift. It's a shift in technology of course but more so in mindset and cultural acceptance."

Top 6 Areas of Cloud-Based Operations Source: "Strategic Tech Decisions During the Pandemic," Chronicle of Higher Education, March 2021



BILL GREEVES
Industry Advisor, SAP

Accelerate Agility and Integrate Data

As higher education offloads humdrum workloads to the cloud, the conversation turns to how to remain open to what's next.

AS THE DEBATE OVER CLOUD VERSUS on-prem resolves, higher education leaders shift their focus to how to leverage the cloud to deliver on their most mission-critical priorities — in research, the classroom, and the provost's office. How to ensure value from every precious funding dollar spent is one question that's not likely to go away anytime soon. *Campus Technology* recently spoke with SAP's **Bill Greeves**, an industry advisor focused on the public sector, including government and education. Greeves says IT and higher ed leaders can rest assured they don't have to determine the answer alone.

The cloud certainly allows colleges and universities to operate with greater agility and to iterate as they go, which has not always been a place where higher education institutions have found themselves.

GREEVES: That's true! And they've struggled in the wake of the pandemic with the loss of their student population and with the infrastructure to support remote learning capabilities while also suffering from student and faculty loss. They had to do a pretty quick shift.

Some schools have done some really great things with remote learning and working capabilities. Some of that they had to MacGyver together practically overnight in order to be able to keep teaching, issuing paychecks, and all of those other critical back-end functions. And now those shifts are permanent to some degree. You can't get that genie back in the bottle. They've got to adapt their existing resources and shift the mentality but also bring in those new systems and capabilities to support that shift. Once they've done that, they can be more agile, more responsive, and be more prepared for the next thing.

What's different today for higher education, as far as how colleges and universities look at the cloud or use the cloud? What prompted those shifts?

GREEVES: The last couple of years in particular have seen just massive amounts of change — but it's not just due to the pandemic. There's always been a movement toward digital, to move more applications and infrastructure to the cloud, and most institutions were somewhere along that continuum to become nimbler and more digital-based — but these last few years expedited the transformation.

Universities have all these applications that support not only their workforce but also their learning capability, building management, everything. All of that was part of the shift forward to continue to support the education workspace. Now that pendulum has swung back somewhat to a more traditional learning environment, but hybrid learning is not going away. It's here to stay. Despite all of the negatives associated with the pandemic, it proved that we can evolve our service delivery and do it very rapidly if we employ the right technologies.

For some time there was this question of whether higher education could meet the

needs of all students, be available when students wanted to learn, and be flexible. It seems like the pandemic required everyone to stop talking about those issues and just make it happen, right?

GREEVES: Yes, that's right, exactly! I think of it as more of a continuum. It's not "we were here and now we're here and we're done." It's more so, "we were there, now we're here, and then we got a less-than-gentle prod so now we're way over here." We're moving faster, we're becoming smarter, and we're learning from those challenges and those opportunities.

There are certainly some challenges, specifically in higher education, with the complexity of their technology landscape. A lot of university systems manage technology in a decentralized fashion, across schools, campuses, departments, and that complexity must be simplified. As a former CIO, I believe that it should be centralized as much as possible, but if it can't be centralized then at least it needs to be more transparent or more visible, so that you understand all of those moving parts and how they can and should fit together.

Beyond the technology piece, what we sometimes overlook or underestimate is the culture shift. Having an effective change management program, and strong governance to keep these things front and center with everybody who's impacted, making sure they understand why these things are being done for them, rather than to them, are important pieces in promoting the culture shift.

So much of the day-to-day operations, research, learning, recruitment, all depends on data. How critical is the cloud to achieving a school's goals in those areas?

GREEVES: Moving out of traditional legacy systems, which most of these universities struggle with, means getting rid of those data siloes. The cloud offers greater integration capability and greater access to data extractions and data sharing, pooling that data, putting it

in a warehouse or a lake. From a business value perspective, that usually means more reliable and easier data management capabilities for the tech staff. Layer a mature analytics suite on top of that and you'll move from single-use, isolated report-outs to a more holistic, predictive analytics model that you can deliver in an accessible manner. The result is cleaner, more comprehensive data, delivered in a successful format to the business users. That's all about shifting from isolated, reactionary reporting to more transparent and accessible foresight. That, to me, is the biggest opportunity of cloud in higher ed, both from a student perspective and a faculty support perspective, all the way up to research capabilities.

When you delve into the larger research universities, perhaps the most challenging component of cloud migration is the security. This is kind of a double-edged sword. Cloud offers the ability to harden your infrastructure, segment and secure critical data and systems, and harden defenses against the most common threat vector, which is our people. Obviously, you're not going to eliminate people from your network, but you can isolate and protect the core systems and segment them in the cloud. On the downside, you have to worry about things like data security. And from a data security standpoint, moving to the cloud raises significant concerns, particularly around regulatory requirements like HIPAA and FERPA. How do you handle things like e-discovery, or personnel matters, or legal processes? That becomes more complex and more time consuming when you move things to the cloud. All of that can be resolved, but it creates a larger challenge. I think sometimes that feels daunting, especially when universities are at the beginning of that continuum in moving to the cloud.

> There's always been a movement toward digital, to move more applications and infrastructure to the cloud, and most institutions were somewhere along that continuum to become nimbler and more digital-based – but these last few years expedited the transformation.
>
> – BILL GREEVES, SAP

Where do you suggest universities get started and prepare for their journey to the cloud?

GREEVES: First, have a strong, modern, mature information security program. Back when I was first getting started in public sector IT, security was about protecting the physical: putting antivirus on the laptops or having intrusion detection tools monitoring your network. When you're talking about the cloud, you want to be able to put stuff out beyond your network. Security is more about managing data assets, knowing where they are, knowing how they're protected, who owns them, who has access to them. It's less about physical security and more about policy management. Second, recognize that all of your contractual agreements with your service providers or vendors must be redesigned. You can't cram this kind of new operating model into the terms and conditions that were designed for on-prem systems. You must have sound clauses around data ownership and continuity of operations. You're almost starting over from scratch to say, "You are going to hold my data for me up here in this area, but I have access to it and I own it."

Are there still adherents to private clouds?

GREEVES: They're still being built. I wouldn't say there's a strong prevalence in terms of one type of cloud over another. However, I think everyone should pursue public cloud options wherever possible, where you get a standard approach, industry best practices are being put into it, and the basic tasks are moving forward on autopilot so that you don't have to spend so much time on it.

Many universities have extremely complex technology landscapes and it's rare that they can

wipe the slate clean with a brand-new install of everything all at once. Whether they have public cloud or private cloud or hybrid, they need an integration platform to help them connect those disparate systems, to deliver comprehensive services to students, faculty, staff, parents, whoever. With a powerful integration platform, having multiple clouds is OK because they can deploy low-code, no-code applications or services, or can reach into systems to perform data mining, even while they're hopefully working on a long-term strategy for consolidation, modernization, and simplification. It takes away the need to define what type of cloud they're going to belong to. What ultimately makes the most sense is striving for that public, simpler version wherever feasible. Saying you want to be there and then getting there, there's a big gap there obviously, so you've got to try to figure out how to get on that path, and while you're going, make the best of your operating opportunities.

What advice would you offer to IT leaders in higher ed today?

GREEVES: Institutions that are moving to cloud and grabbing onto some of the cutting-edge technologies to get rid of mundane, routine tasks are finding ways to employ technology to make better use of very limited resources, whether that's staffing or funding dollars. This frees up staff to complete more critical tasks that require a human touch. To me, that's the best use case for technology and you cannot get there through a legacy on-prem solution. You've got to be up for the very latest and greatest to take advantage of that. Don't go out and buy shiny new technology for technology's sake, but if you know what your university's business objectives are and you can find the technology to fulfill that need, then that's really the pinnacle. That's where you want to be. You want to be able to say, "This was a business problem we had. This technology did that for us, and now we've got this additional capacity to do the next thing." And then you'll be more flexible, more adaptable, and generally more prepared for whatever happens next!

What Are We Waiting For?

Awareness and acceptance of the need for cloud-based tools marks only the first hurdle to adopting a culture of change and moving forward on mission-critical cloud initiatives. While higher education has surpassed that initial hurdle, much work remains.

CHANGE IS HARD. IN ANY IT project, upgrades to technology or infrastructure must be accompanied by changes in culture — the attitudes, people, and processes that make implementations successful. And in higher education, that culture piece is perhaps the most challenging.

Earlier this year, when ***Campus Technology*** asked higher education and ed tech industry leaders to forecast the **most important trends to watch in 2023**, change management emerged as a key theme. As Vicki Tambellini, CEO of the higher education-focused analyst firm Tambellini Group, put it:

"Despite the seismic external disruptions to higher education's operating environment since 2020, the culture of most institutions **has not changed** in response — many have reverted back to their pre-pandemic 'old normal.' Most traditional institutions still operate the way they did before the pandemic — they are distributed organizations that require consensus in decision-making from a vast array of stakeholders. And while more campus leaders now understand the value and need to modernize their technology infrastructure, making a successful transition to a cloud-based operating environment will remain challenging

because it requires massive changes to people and processes to work."

Eighty-six percent of higher education administrators say the pandemic increased strategic collaboration regarding technology, according to *The Chronicle of Higher Education*'s **"Strategic Tech Decisions During the Pandemic"** report, and 75% expect that collaboration to continue. Collaboration does not necessarily equate to agreement on strategic direction and approach, but conversations have become more informed and grounded in strategy, Educause's Susan Grajek reports. Grajek says that, by and large, higher education leaders "understand that data governance and data integrations are critical if we're actually going to put data to work," and increasingly understand "that cloud is fundamental ... to a more manageable and more cost-effective and less complicated technology infrastructure."

One step on the path forward requires higher education IT leads and technologists to continue to demand a seat at the table when strategic institutional decisions are being mapped or made. Without that perspective, initiatives risk critical computing support or data-informed direction, all of which is now table stakes for not only achieving digital transformation but also exceeding student expectations for learning, research, and preparation for a new data-centered world.

"What is our product? What is it we want to ensure students receive with this frictionless approach to the digital world of learning?" asks Audrey Penner, the president of Ontario's Northern College, in **a blog post** published by The evoLLLution. "As an outcome, the product would be a diploma or degree; however, we need to think about each step it takes to get to that ultimate product, with mini products along the way. Expectations are high, and students will not have the patience for a frustrating online experience. Courses need to be well designed, easy to access and personalized to what the student needs."

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– VICKI TAMBELLINI, TAMBELLINI GROUP

The level of data persistence and aggregation required to accomplish that successfully can only be achieved through cloud-based tools and computing. With so many strategic initiatives and priorities poised to gain so much thanks to the cloud, it's only becoming more difficult for institutions to justify why they haven't made the shift already.