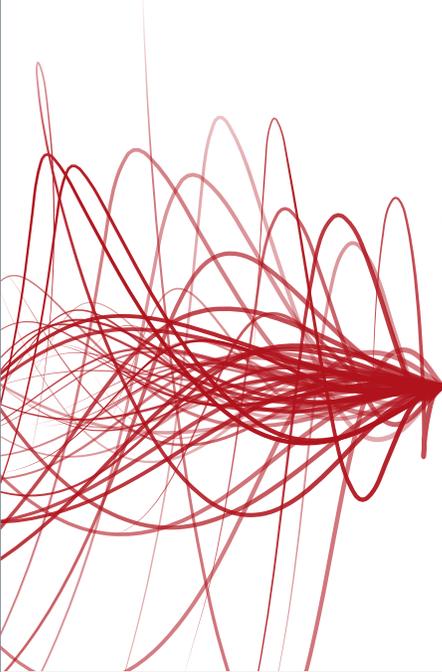




GETTING
**SMARTER
WITH DATA**
IN HIGHER EDUCATION

**IMPROVING STUDENT
OUTCOMES, MAXIMIZING
REVENUES AND OPTIMIZING
CAMPUS OPERATIONS**



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By boosting your institution's data management capabilities and maximizing the power of your data analytics, you can improve student recruiting and retention, enhance data efficiency and security, and become more competitive.

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STREAMLINING BIG DATA STORAGE AT DREXEL UNIVERSITY

Big data can be a boon to educational institutions — but storing and managing ever-increasing amounts of data presents big challenges. Drexel University in Philadelphia faced this problem recently, when its IT administrators realized it was time to replace their aging storage systems.

Drexel University has two IT departments — a central IT agency and an IT department that serves the College of Medicine. Together, these departments serve more than 36,000 users and store approximately 3 petabytes of data.

Two years ago, performance lags and aging equipment prompted Drexel leaders to replace the university's six-year-old storage systems. Drexel's IT administrators braced themselves for the headaches of a forklift upgrade. But those headaches never came because the university implemented Pure Storage.

With Pure's Evergreen Storage model, customers can upgrade to the most modern hardware and software every three years, as long as they stay current on Pure's flat maintenance plan.

For Drexel, that means it not only get new controllers every three years but can integrate new technologies and expand capacity non-disruptively — no forklift upgrades required.

Drexel purchased Pure Storage arrays for both IT departments, as well as a disaster recovery site. Both IT departments then migrated their data and applications onto Pure Storage arrays in a phased approach.

With so little latency and high performance, the storage array is no longer a likely suspect when someone reports an app performance issue.

At the College of Medicine, not only has Pure Storage's simple user interface made a big impact, but performance problems and user complaints have disappeared, and upgrades have gone smoothly with zero disruption.

"Our engineers say Pure is a major improvement over what we had previously," says Rob Kaniewski, director of technical services for the College of Medicine.



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INTRODUCTION

SIX YEARS AGO, Georgia State University (GSU) gathered a decade's worth of its historical data with the help of a third-party vendor — some 15,000 student records and 2.5 million grades — and applied advanced analytics. Officials hoped to use this information to uncover early-warning signs for students in danger of dropping out of school.

"We wanted to intervene at the right time to turn potential dropouts into college graduates," says Dr. Timothy Renick, vice provost and vice president for enrollment management and student success.

He thought there might be a couple dozen danger signs — instead, the project identified a staggering 800 risk factors. The most significant risk factor was a student receiving a low grade in the first class within his or her major, but factors such as sub-par performance in other subjects and spotty class attendance also set off alarms. Undaunted, Renick and his staff created a

"FOR THE FIRST TIME, WE'RE BEHAVING RESPONSIBLY WITH OUR DATA."

Dr. Timothy Renick, Vice Provost and Vice President for Enrollment Management and Student Success, GSU

system to alert advisors when their students hit a risk threshold, so they can intervene.

"For the first time, we're behaving responsibly with our data," Renick says.

The investment in predictive analytics and a related expansion of the advisory staff quickly paid off. Within six months of launch, semester retention rates increased by about 4 percent across the student body, while some groups — including transfer and part-time students, adult learners and individuals enlisted in the military — registered even higher gains. Retention rates have continued to climb, and today 30 percent more students — or 1,700 individuals — graduate from GSU, at a time when enrollments have risen only 5 percent.

GSU isn't alone in trying to gain more value from data. Higher education institutions across the country, including the University of Wisconsin, Ohio State University and a host of others, are deriving important insights from large volumes of data and sophisticated analytics.

Applying advanced analytics technologies and analyses is a complex undertaking, and success isn't assured. Fortunately, new strategies from higher education institutions and the private sector — coupled with ongoing technology innovation — enable campuses to overcome data silos and the lengthy implementation and high costs associated with solutions in the past. ●

HIGHER EDUCATION INSTITUTIONS ACROSS THE COUNTRY ARE DERIVING IMPORTANT INSIGHTS FROM LARGE VOLUMES OF DATA AND SOPHISTICATED ANALYTICS.

BEHIND THE PUSH FOR ADVANCED ANALYTICS

COLLEGES AND UNIVERSITIES

are eyeing a variety of potential benefits as they increase their commitment to analytics:

- Improved student outcomes
- More effective recruiting campaigns
- Curricula that resonate with today's students
- Higher student retention rates
- More efficient campus operations
- Enhanced safety and security

Many public institutions have another reason to act: accountability requirements.

“State legislatures are looking at or implementing programs that use data about graduation rates and other performance measures to gauge campus success,” says James Jorstad, director of IT and client services at the University of Wisconsin-La Crosse (UW-La Crosse). “In turn, the most successful campuses could get a larger share of public education dollars.”

Wisconsin lawmakers are considering these measures, but in the meantime, UW-La Crosse officials already use analytics to improve on-time graduation rates, identify struggling students and guide changes in classroom content.

Other institutions are also taking the initiative to better capitalize on data, says Glenda Morgan, research director for higher education at Gartner, a technology research firm. For example, she has worked with a medical school to encourage doctors to establish practices in rural areas. School officials study the profiles of graduates who follow that career path, and use this information as a factor in accepting incoming students.

In addition, some campuses are turning to analytics to assess student wellness, particularly to support programs designed to avoid suicides by students who face intense pressures.

“The goal is to identify behaviors that indicate a potential problem and intervene in time to help,” says Morgan. ●



THE DATA DEMANDS OF A CONNECTED CAMPUS

Increasingly, higher education institutions rely on smart technologies to create a more connected campus. In a recent Center for Digital Education survey of 138 higher education officials, 86 percent said connected campuses are the accepted future. With drivers ranging from improved learning outcomes to cost savings to better student/faculty engagement, it seems like a no-brainer.

There is one thing that could hold campuses back: data. Higher education institutions generate a lot of data, and to truly harness smart technologies to become more connected they need to access, share and analyze that data.

CenturyLink is uniquely positioned to help institutions with their data challenges and build connections along the way. Our comprehensive portfolio of Big Data & Advanced Analytics Solutions help higher education institutions leverage and integrate data to harness IoT, visualization and predictive capabilities, ensuring you feel confident on your path to a connected campus.

Nearly half of CDE survey respondents expressed a need for data analytics and management services.

46%

64%

The top perceived benefit is data-driven decision-making.



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WHY ANALYTICS ISN'T EASY

SUCCESSFULLY HARVESTING

data to improve academic and institutional performance is not a simple task. One challenge is managing large volumes of data, including historical information and new data coming from disparate sources — including integrated learning platforms, online and distance learning initiatives, student ID and activity cards, and recruiting systems.

For many institutions, this means adopting new technologies or outside services to transform IT environments that traditionally have locked data within applications, academic departments and administrative offices. These silos impede information sharing and lead to data inaccuracies or incompatibilities. One solution to this is a data governance policy that enforces data sharing and maintains an authoritative data dictionary.

But wrangling data is just the first step. Institutions must also turn their data into valuable insights and ensure they have the resources to translate these insights into clear actions that deliver successful results.

In the past, institutions tried to improve their analytics prowess by overhauling existing IT environments, embarking on long and expensive implement actions of complex data warehouses and business intelligence systems, and recruiting highly skilled — and high-salaried — data scientists. These projects were necessary because many enterprise resource planning (ERP) systems came with underdeveloped analytics and reporting modules.

Few institutions could devote the necessary resources, and those that could encountered modernization timelines that were so long, new

systems could be outdated by the time they were up and running. In addition, commitments to data and analytics modernization often wavered with changes in administrative leadership and spending priorities.

Despite challenges, many colleges and universities are pressing ahead with analytics modernization plans. CDE conducted a survey in June 2017 to assess the status, acceptance and perceived benefits of connected campus technologies, including applications for the Internet of Things. The 138 respondents were primarily faculty, provosts and deans, and senior technology executives at four- and two-year public and private institutions.

When asked to name connected technologies that will be implemented or expanded in the next 12 to 18 months, respondents listed data analytics (20%) and data-driven research and decision-making tools (17%) as two of their top three choices.

What's more, nearly half (46%) said their campus administration has an interest in or need to implement data analytics and management services, with 64 percent identifying data-driven decision-making as the top perceived benefit for these implementations. ●

IN A JUNE 2017 CDE SURVEY, 46 PERCENT OF RESPONDENTS SAID THEIR CAMPUS ADMINISTRATION HAS AN INTEREST IN OR NEED FOR IMPLEMENTING DATA ANALYTICS.

UNDERSTANDING WHAT'S POSSIBLE WITH ANALYTICS

UW-LA CROSSE IS LOCATED

in a small city on Wisconsin's western border along the Mississippi River. The campus uses data from its student information system (SIS) to track completion rates and analyze trends important for making investments.

"This helps us look at what resources we have, and then spend wisely," Jorstad says.

For example, several years ago, UW-La Crosse staff analyzed large data sets to identify ways to help incoming freshmen improve their math skills. The data showed that more than 90 percent of the students could be served with an online course to get the help they needed, either as high school seniors or first-year college freshmen taking math prep opportunities and massive open online courses (MOOCs). Supporting students with online coursework helps them

avoid remedial math classes, and saves them time and tuition costs.

"Predictive analytics told us that if we made a targeted investment of resources in an online class, we could save students time and money and get them into the program much more quickly," Jorstad says.

GSU is a stark contrast to UW-La Crosse in terms of size and geographical location, yet both schools share an ability to improve performance with sophisticated analytics. Based in Atlanta, GSU is a large, urban university with a diverse student population comprising 65 percent non-white and 60 percent low-income students. Renick says the benefits from graduating higher percentages of students — including increased revenue — are rippling throughout the organization.

"There's a lot to be gained financially by having students enroll for seven or eight semesters rather than one or two semesters," Renick says.

GSU invested about \$150,000 to get its analytics program running in 2011. Renick estimates the university collects about \$3 million a year in continuing tuition and fee revenues for every one-point retention rate increase.

"There are multiple factors that go into retaining students, but even if we attribute only half of that gain to the analytics initiative, that's at least \$6 million in the first six months of revenues from a program that cost \$150,000 to launch," he says. "As with all investments, it's scary to put the money into something that won't generate returns for months or semesters. But we feel that investing in data is a slam dunk."

Since the program's launch, GSU has spent about \$2.5 million a year for the data program and for 50 additional student advisors. The cash infusion from greater retention came at an opportune time. During the recession, GSU lost nearly \$50 million in state appropriations, but the revenue gains from higher graduation rates meant it didn't need to cut back on expenditures.

"In changing competitive times, no organization survives if it's exceedingly cautious and afraid to invest in change," Renick adds. "But you have to invest wisely." ●

**"WE FEEL THAT
INVESTING IN DATA
IS A SLAM DUNK."**

Dr. Timothy Renick, Vice Provost and Vice
President for Enrollment Management and
Student Success, GSU



DECODING YOUR DATA

GET MORE VALUE OUT OF YOUR INFORMATION WITH TABLEAU

Increasing graduation rates. Boosting organizational efficiency. Planning for future growth. Meeting reporting requirements.

Sound familiar? Campus leaders face myriad — and not insignificant — challenges as they work to ensure their institutions succeed. To meet these challenges, they are increasingly looking to the massive amounts of data their institutions collect.

But finding ways to quickly and easily make use of that information isn't easy. Data is often siloed or displayed in the rows of a spreadsheet where people can't understand it, let alone act on it.

Tableau data analytics allows users to easily drill down to get answers to their most pressing questions. Its data visualizations make information easier to comprehend and allow campus staff to quickly analyze complex data in a few clicks.

For example, Indiana University (IU) uses Tableau to identify trends and gaps within course offerings that could potentially impact student success. Bridgett Milner, senior associate director of the IU Office of Enrollment Management, notes how invaluable Tableau has been as she researches undergraduate recruitment, enrollment and retention to drive projects related to student achievement.

"The biggest surprise was how easy it was to use," she says. "We can uncover trends easily. Things that used to take us hours now take us mere seconds. Having a tool where we can easily break things apart when we're making decisions is powerful."¹

Tableau makes it simple for educators and administrators to ask sophisticated questions, get actionable answers and share their findings online.

TABLEAU:

-  Empowers administrators and educators with self-service dashboards
-  Increases the speed of analytics implementations and deployments
-  Builds flexible and secure configurations
-  Enables actionable insights with data visualization

¹ <https://www.tableau.com/solutions/customer/tale-two-universities-tableau-higher-education>

 FIND OUT MORE AT WWW.TABLEAU.COM





ANALYTICS MATURES

AS THEY'RE PURSUING academic and institutional benefits, higher education officials are finding that analytics is shedding some of the complexities and challenges of the past.

Advances in analytics enable deeper, more impactful insights.

For example, schools can spot student behaviors that predict academic struggles and dropouts. GSU didn't have to spend lavishly on new data collection systems or expensive third-party data to achieve this. Instead, it capitalized on a wealth of information it had routinely collected for decades, like student majors and grades.

"Our big leap forward was to ask, 'What can we learn about our students and the risks they're facing if we use the data more proactively?'" Renick says.

After combing through years of historical information, officials determined the students who proactively visited academic advisors were usually those who needed advice the least — most were high performers likely to graduate anyway. However, students who needed help would typically walk into an advisor's office as a last-ditch effort. They had struggled academically for multiple semesters, were on academic probation and some had already lost their scholarships and didn't have financial resources to continue.

"Too much damage had been done at that point to turn these students around," Renick recalls.

Now, the system alerts advisors within weeks of a new semester if any one of the 800 alarms goes off. Advisors reach out within 48 hours to arrange a meeting and devise a turnaround strategy. In the last year, advisors have conducted 52,000 one-on-one meetings.

What sets off alarm bells? One of the most common triggers is a low grade in a foundational subject, such as the first college math class for accounting majors. GSU found these correlations when data analyses

showed that 75 percent of political science majors who get an A or B in their first political science course graduate on time. Of those who get a C, only 25 percent do.

"We had never done anything with that C student before," Renick says. "We weren't thrilled with seeing them get a C in their first course, but we assumed that because they got a passing grade, they're ready to do upper-level work. The data showed us that without some intervention and support, that's not the case. The old model was wrong."

As early as two and three weeks into the semester, if a student isn't doing well on quizzes or is not attending their classes, an advisor intervenes. Renick acknowledges that meetings alone don't account entirely for the improved outcomes, but he considers proactive interventions a significant factor in the higher graduation rates.

Administrators and faculty can capitalize on digital dashboards to analyze information for decision-making and reporting.

Dashboards also offer the public greater transparency into institutional operations. Besides presenting data to stakeholders in an easy-to-understand format, dashboards help institutions optimize their use of highly skilled talent. In the past, IT staff and data scientists had to create reports. Now, dashboards can automatically generate key summary data for faculty and administrators, which enables data specialists to devote more time to creating custom reports with more strategic value to financial and academic activities.

Dashboards and report generators tailor results for individual roles and responsibilities.

Analytics programs can now apply standard reporting formats and role-based interfaces to deliver information that's relevant to specific academic and administrative disciplines. This ensures recipients quickly see what's most important to them without having to wade through results not directly relevant to their needs.

HOW ANALYTICS PROMOTES DIVERSITY

After seeing its student retention rates rise in part thanks to a six-year predictive analytics initiative, GSU drilled deeper into the numbers and discovered additional reasons for declaring success.

In the last five years, GSU has more than doubled the number of African American students completing STEM majors, while the number of Latino students gaining those types of degrees has tripled.

"This isn't because a lot more students are declaring STEM majors — enrollment of African American and Latino students rose only 10 and 20 percent," says Renick. "The reason is that fewer students are dropping out of those majors after a year or so. They're able to persist and graduate in those degrees because we're intervening when signs of trouble appear."

IN THE LAST FIVE YEARS, GSU HAS **MORE THAN DOUBLED** THE NUMBER OF AFRICAN AMERICAN STUDENTS COMPLETING STEM MAJORS.

Cloud services enable colleges to layer modern capabilities on top of legacy IT systems.

This speeds implementations and avoids costly rip-and-replace overhauls. Another option is for institutions to replace outdated on-premises ERP systems with equivalent cloud services, which initially may be implemented more quickly and with lower capital investments than when schools buy and install on-premises hardware and software. (Note: Cloud adoptions still require IT managers to devote time and money for data governance, integration and security.)

The cloud offers colleges and universities options to ramp up their analytics capabilities as well. For instance, the public cloud model can provide outside computing and storage resources to implement new analytics software and house large volumes of data. This reduces the need for new capital investments in hardware and software and lowers the ongoing costs of maintaining the infrastructure. Public clouds are particularly useful when leaders want to pilot analytics projects but not use valuable resources from their existing IT infrastructure.

Many public cloud services now can store both structured and unstructured data within a common data repository. This ensures analyses will utilize all relevant information, rather than drawing conclusions from subsets of data. It is also easier to apply security policies consistently across centralized data. In addition, the security expertise and technical resources of leading public cloud vendors enable them to provide highly secure environments to protect data.

Another cloud option is a software-as-a-service (SaaS) platform with analytics engines tailored for higher education. Providers can pull data into proprietary cloud-based infrastructures where the information is standardized and analyzed according to the goals of individual colleges and universities. On-staff data scientists can help institutions model and interpret the data, which reduces some of the burden campuses face to hire and retain high-priced data experts.

Ohio State University began implementing a SaaS platform for improved academic outcomes last year, and officially launched it for

4 TIPS FOR IMPROVING SECURITY AND PRIVACY IN THE AGE OF BIG DATA

New security and privacy tools make it easier for institutions to update and enforce data protection policies. But for maximum benefit, colleges and universities must integrate new technology within a broader security strategy.

“The more data we collect and share, the more we have to guard against security issues down the road,” says UW-La Crosse’s Jorstad.

Key focus areas include documenting how data is being protected, which internal and external parties have access to data, and where it’s stored once it flows to outside parties and cloud service providers.

Addressing these issues requires institutions to manage data protection from a variety of angles. The following tips can help.

1 INFORM STAKEHOLDERS OF POLICIES AND GAIN BUY-IN. Develop a program to keep students and parents informed about the school’s security and privacy policies, as well as the latest types of threats, such as ransomware, hitting higher education.

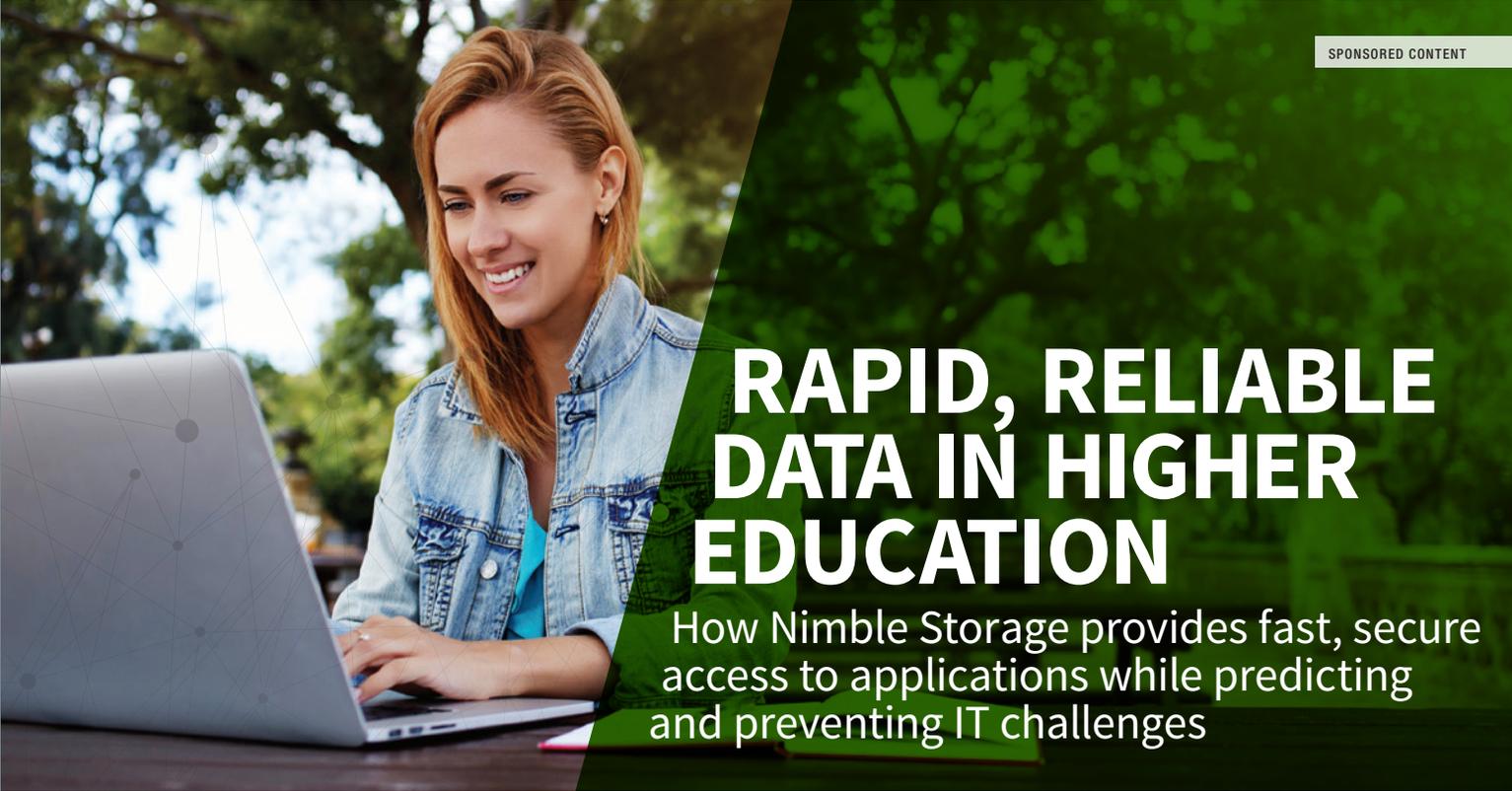
Similarly, inform and gain buy-in from faculty and staff by helping them understand how data governance is imperative in the face of accountability, and in some instances, because of state regulations.

2 ENSURE COMPLIANCE WITH REGULATIONS. Complying with FERPA is necessary, but consider this a minimum requirement. Look to increasingly stringent data- and breach-disclosure laws that exist in 48 states and the District of Columbia as better ways to define personally identifiable information (PII).

3 PROPERLY VET PROVIDERS. Scrutinize the data security portions of cloud contracts, and request copies of any third-party audits or proof of the provider’s compliance with regulatory standards (current and ongoing).

4 CONSIDER THE ETHICAL USE OF DATA. Ohio State tapped the expertise of ethicists from its philosophy department and the legal staff to formalize internal compliance rules for its data initiative.

“When you’re relaying sometimes negative results of your analyses to a student, you have to be careful to not crush someone’s dreams,” says Julia Carpenter-Hubin, assistant vice president for institutional research and planning at Ohio State. “You need to act in a way that supports and guides them, rather than telling them ‘This is what the data says, and here is what you must do.’”



RAPID, RELIABLE DATA IN HIGHER EDUCATION

How Nimble Storage provides fast, secure access to applications while predicting and preventing IT challenges

Predictive analytics helps higher education institutions in many ways, from improving student retention to enhancing recruitment.

To maximize the impact of technologies like predictive analytics, you need high-performance storage that's secure and reliable with an easy-to-use interface. Nimble Storage, a Hewlett Packard Enterprise company, is a proven industry leader that can give you all of this while reducing your costs.

For example, when Mesa Community College in Arizona shifted to a hybrid IT approach, leaders chose Nimble Storage as part of their solution, which helped increase performance by at least five times and reduce time spent managing infrastructure by two-thirds. Mesa expects to save hundreds of thousands of dollars in operating expenses over five years.¹

TOP NIMBLE STORAGE SOLUTIONS:

- **All Flash arrays** provide unrivaled performance, scalability and ease of use, with total cost of ownership that's 33 percent to 66 percent lower than other All Flash arrays in the market. Also available is Nimble's **Adaptive (Hybrid) Flash**, or you can combine both. No matter which you choose, you'll have rapid, reliable, cloud-ready data storage.
- **InfoSight** predictive analytics platform monitors your infrastructure — beyond storage — to identify and prevent slowdowns or disruptions, automatically detecting 86 percent

of all issues and resolving them before customers encounter problems.² This saves your IT team time and effort, and prevents downtime.

- **HPE Converged Architecture 700 with Nimble Storage** is a predictive converged infrastructure solution built on industry-leading HPE server and networking infrastructure, in addition to Nimble's cloud-ready storage and predictive analytics. It results in a complete solution that is radically simple and reduces time spent on implementation and management.

Nimble Storage solutions remove complexity so you can put your efforts where they count — analyzing data — rather than managing cumbersome interfaces. If you do encounter a problem, Nimble offers flat support pricing — not to mention all-inclusive licensing and guaranteed satisfaction.

INDUSTRY HONORS:

- ★ Leader in the 2017 Gartner Magic Quadrant for Solid-State Arrays
- ★ Leader in the 2016 Gartner Magic Quadrant for General-Purpose Disk Arrays
- ★ 2016 CRN Tech Innovator award for AF1000 All Flash Array

ENDNOTES

1. <https://www.nimblestorage.com/case-study/mesa-community-college/>
2. http://www8.hp.com/us/en/hp-news/press-release.html?wireId=2129104#WV_RgdPyvE



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the spring semester. It's too soon to assess the results, but officials hope predictive analytics will warn advisors when students start showing signs that lead to poor performance in their majors or indicate other potential problems.

"We had talked about building something on premises, but our CIO advised against the instinct to build as there were already excellent resources in the marketplace to help us achieve our technical goals faster and at a lower cost," says Carpenter-Hubin.

The vendor helped the university with the difficult task of data cleansing, which was exacerbated because Ohio State switched from quarters to semesters a few years ago.

"It was an issue to line up historical data so things like course names and the numbers of hours were rationalized," Carpenter-Hubin says. "Now we can send data feeds to the platform, and data specialists with the service provider develop the predictions behind the scenes. Advisors see the results in electronic dashboards."

SaaS expertise can help jumpstart data programs, but university officials warn against taking a set-it-and-forget-it approach to these services. Instead, stay in close contact with service providers to remain current with the logic behind the data models and the conclusions they generate for standard reports.

"As more campuses start to look at these software platforms, they are questioning the 'black box' behind the models," says Natalie Solverson, director of institutional research at UW-La Crosse. "Schools want more information about what factors go into the predictions of a student's success."

Today's technology can better accommodate unstructured and dirty data. Advances in algorithms make it easier for organizations to analyze historical information that's been formatted for the rows and columns of traditional relational databases. But just as important, these tools can also interpret non-standard data — such as what's being harvested from social

media networks — to comprehend student sentiment and behavior. Merging structured and unstructured data is getting easier thanks to various big data platforms.

In addition, schools now have more effective options for cleaning inaccurate and redundant information due to unclear policies, lack of succinct data definitions and data-entry errors. Without standards for acceptable entries in database fields — and capabilities in place to reject anomalies — institutions will struggle to determine something as fundamental as how many students have declared a particular major. Discrepancies can arise, for instance, when entries list some students in "Biological" and others in "Biological Sciences."

The importance of efforts in this area cannot be overstated. Our interviews with higher education officials reveal that cleansing historical data often takes the bulk of time and personnel resources at the start of analytics initiatives. ●

"NOW WE CAN SEND DATA FEEDS TO THE (SAAS) PLATFORM, AND DATA SPECIALISTS WITH THE SERVICE PROVIDER DEVELOP THE PREDICTIONS BEHIND THE SCENES. ADVISORS SEE THE RESULTS IN ELECTRONIC DASHBOARDS."

Julia Carpenter-Hubin, Assistant Vice President for Institutional Research and Planning, Ohio State University





HOW AWS HELPED IVY TECH COMMUNITY COLLEGE IMPROVE STUDENT SUCCESS

Ivy Tech Community College is Indiana's largest public post-secondary institution and the nation's biggest singly accredited statewide community college system, serving nearly 170,000 students annually. With 19 campuses and 26 additional sites, Ivy Tech produces about 100 million rows of data per day across its various systems.

"We had a very siloed approach to collecting and analyzing data," said Lige Hensley, chief technology officer at Ivy Tech. "Gathering information sometimes required tapping into 20 to 30 different systems. Not only was it difficult, it gave us very inconsistent results."

The process was also slow.

"People would ultimately go with their assumptions or their gut instead of waiting for results," said Hensley. "It also meant many people would call IT for help, which tied up my team."

Ivy Tech wanted to build a fast, flexible, self-service analytics tool that could bring data together and provide "one source of the truth." Hensley and his team knew a cloud-based platform would allow them

to build and optimize such a tool and enlisted Amazon Web Services (AWS) to assist them.

"We had AWS engineers helping us within about 10 minutes," said Hensley. "It made all the difference."

Using the AWS Cloud and Amazon Redshift, Ivy Tech successfully built a self-service data analytics tool that curates information from multiple systems quickly and easily. The self-service tool is now available to Ivy Tech staff looking to analyze the college's trove of data.

Perhaps most importantly, the tool helps Ivy Tech improve student success. Using predictive analytics, Hensley and his team can forecast how students will perform. Ivy Tech recently used that data to identify approximately 3,100 at-risk students, and reached out to them to provide support and assistance. Those students are now successfully passing courses they previously may not have.

"With intervention, we reduced the number of Ds and Fs by 3.3 percent," said Hensley. "Using analytics to pinpoint which students were struggling allowed us to help them before it was too late."



For more information about AWS, visit www.aws.amazon.com/education.



A GAME PLAN FOR
ADVANCED
ANALYTICS

WHAT CAN COLLEGES and universities do to put their new analytics initiatives on the right track? Veterans of large analytics projects say seven areas require close attention.

1 Define an overall data strategy.

Think about data from all directions. Don't implement a data program just for current and incoming students; broaden the strategy and plan to encompass activities for faculty, staff and operations.

Colleges and universities should view the plan as a multi-year roadmap rather than try to implement the entire strategy from the start. Data veterans advise taking an agile approach — identify one prime area to focus on, such as improving retention rates, and apply lessons learned from that effort to subsequent projects.

TIP TAKE AN AGILE APPROACH BY IDENTIFYING ONE PRIME AREA TO FOCUS ON AND APPLY LESSONS LEARNED FROM THAT EFFORT TO SUBSEQUENT PROJECTS.

2 Take a fresh approach to data governance.

Without successful governance policies, analytics maturity will be impossible. But developing them will likely be the highest hurdle for many institutions to overcome. Start the process by gathering relevant stakeholders from

throughout the institution, including senior representatives from academic, administration, IT, risk management and legal offices, as well as student leaders. This group must then craft policies for maintaining data security and privacy without draconian measures that inhibit information sharing vital to higher education communities.

Next, launch a comprehensive program to clean up inaccurate and conflicting data. If the underlying data is inaccurate, even the best analytics strategies and tools will produce skewed results. With the help of an SaaS platform vendor, GSU corrected thousands of historical student files. It then established standardized terms to enter in database fields to ensure new information is consistent. Now, when the university runs a nightly batch process to update student information, a program confirms that all entries made in the past 24 hours align with the data standards. Errors are flagged and corrected before the next update.

3 Break down departmental silos.

As institutions begin to use data more effectively, they can look for valuable data-sharing opportunities between administrative departments. This may require organizational changes. GSU brought together admissions, financial aid, the registrar, academic advising and other departments under one management umbrella. The goal is to coordinate support from the time students first express interest in the university to after they graduate.

To speed analyses, the university also integrated the institutional research team into the central office. When research was a standalone department, reports based on student data typically required days or weeks to be delivered. Since three researchers are now dedicated to the task, turnaround times have shrunk to hours.

“That’s significant, because I now have much more data at my disposal, as do the leaders of advising, financial aid, admissions and career services,” Renick says.

The central management structure is designed to encourage departments to share information more effectively. GSU is coordinating financial aid and housing activities in an additional attempt to boost retention. Officials hope to head off problems for students whose aid package is based on them sharing a quad, but who are tempted to move to a single room when one becomes available in their dorm.

“What 18-year-old is going to say, ‘Let me pause for a moment to see if living in a single works with my budget?’” Renick says. “He or she is more likely to jump at the chance, not realizing that they’ve just doomed themselves to not getting through the academic year from a financial perspective. We’re identifying early-warning signs that show when students may be making financial decisions that might lead to them struggling or dropping out.”

GSU is now piloting the departmental integration program and working out not only the technical considerations, but also the best ways for advisors to use the information.

“We don’t want to make academic advisors financial aid counselors, but we do want to give them information to help students make appropriate decisions,” he says.

4 Identify technology gaps.

Use the strategic plan to determine what new tools or services will be needed to manage and analyze data. The good news is that today’s analytics applications and services are relatively easy for faculty and staff to use. The bad news is that the market is so large and fragmented, sorting through the choices is daunting.

TIP NARROW THE LIST OF POTENTIAL DATA VENDORS BY CONSIDERING NOT ONLY THE QUALITY OF THEIR DATA MODELS AND REPORTING TOOLS, BUT ALSO THEIR ABILITY TO HELP IMPLEMENT DATA STRATEGIES.

“The market is chaotic right now,” Morgan from Gartner says, adding that she now tracks more than 40 vendors with analytics offerings tailored for education. “It’s difficult for many in higher education to even write an RFP because this is such a confusing space.”

Her advice is to narrow the list of potential vendors by considering not only the quality of their data models and reporting tools, but also their ability to help institutions implement their data strategies, including tackling areas like data cleansing.

5 **Develop a plan to act on data.** As project leaders implement tools and an ongoing modernization strategy, they must also create a disciplined approach to interpret information.

“Higher education is good at gathering a lot of data, but not necessarily at acting on it,” says Patricia Fairchild, administrative program specialist for information technology services at UW-La Crosse. “It often starts with basic questions, such as ‘What do you want to know and why do you want to know it?’”

Officials also need to look at data from multiple angles to ensure their analyses are accurate. To assess student engagement in online courses, consider an individual’s

overall engagement with the instructors, course content and other students.

“Go beyond simply looking at who’s signing in and how often they do it,” Fairchild says. “Also consider participation in discussions and the use of synchronous tools.”

6 **Plan for a growing onslaught of new data.** Colleges and universities are discovering the benefits of using historical student data more effectively. But these caches of information may be just the beginning. Some institutions are exploring ways to capture additional data about students, including their public social media communications, and how often they visit the library, sign into the campus Wi-Fi network or attend school activities.

These initiatives may raise privacy concerns, but this can be partially addressed by implementing data anonymization techniques and encouraging students to opt in to data-sharing initiatives. No matter what approach campuses choose, one thing is clear: Officials must determine how they’ll manage ever-growing volumes of information.

A June 2017 CDE survey looked at this data storage challenge more in depth. CDE asked more than 100 higher education respondents to identify which data-intensive areas they expect to expand in the next 12 to 18 months. Video-based or other digital student learning tools ranked at the top at 48 percent, but new data analytics capabilities followed closely at 41 percent.

Due to these results, institutions will almost certainly need to increase their storage capacity in the near future. In fact, only 7 percent of respondents said they expect their institution’s storage needs to remain the same over the next five years. Just five percent said they expect their need for storage of any kind — cloud, physical or both — to decrease. By contrast, 47 percent of respondents expect to increase their use of both cloud and physical storage in the next five years, with another 14 percent expecting to need only more cloud storage. A small fraction — 1 percent — expect to need only more physical storage.

7 **Manage cultural change.** Finally, project leaders shouldn’t let the focus on implementing new data strategies and innovative technology blind them to potential cultural challenges and push back against predictive analytics.

“One of the problems that higher education faces is how to cultivate a data-driven culture across the organization, from deans and department chairs to advisors and faculty,” Morgan says.

Ohio State’s Carpenter-Hubin agrees, and has seen this play out in the university’s efforts to improve student outcomes. “Advisors have been successful at doing their jobs for a long time, and they know a lot about what is likely to help individual students succeed,” she says. “Tensions may arise when they’re now being asked to use predictive models to do their jobs better.”

Advisory staffs are decentralized within the university’s various colleges, and managers in each area are addressing advisor acceptance in their own ways. The common thread is to always balance the experience and talent of people with the conclusions derived from analytics tools.

“Similar types of analytics systems are being used in medicine, and you’d never say to a doctor, ‘Follow this treatment plan because this is what the system says,’” Carpenter-Hubin points out. “Proactive analytics are here to support human decision-making, not replace it.” ●

TIP BALANCE THE EXPERIENCE AND TALENT OF PEOPLE WITH THE CONCLUSIONS DERIVED FROM ANALYTICS TOOLS.



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TAKING THE LONG VIEW

COLLEGES AND UNIVERSITIES ARE MOVING QUICKLY

to investigate — and, in many cases, adopt — ambitious analytics projects to capitalize on their rich storehouses of data. The incentives often come from internal pressures to improve student outcomes and operate more efficiently. But a growing list of outside pressures, including performance-based funding strategies imposed by state legislatures, are also prompting action. In either case, the early experiences of leaders already using advanced analytics show promising results. These trailblazers also point out ways to overcome common challenges such as inconsistent data, data governance complexities, a fragmented technology market and cultural change.

Hurdles like these can't be overcome quickly, which means institutions must commit to step-by-step progress spanning multiple years, and be prepared for occasional setbacks.

"It's messy and hard, especially in the very beginning," says Ohio State's Carpenter-Hubin. "But it's worth it in the long run if it helps students graduate with the degrees that will allow them to be most successful in their lives." ●

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