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# Foundations for Innovation

In higher education, harnessing the full potential of data analytics and AI/ML toolsets requires more than up-to-date infrastructure. Sound data governance, safeguards for sharing, and a campus-wide culture of accepting constant change are non-negotiable.



**AS HIGHER EDUCATION NAVIGATES AN ONGOING DATA REVOLUTION**, many institutions continue to fall short when it comes to tapping the full potential of analytics and artificial intelligence to advance student success goals. Outdated data infrastructure, persistent data silos, and data governance hurdles most often stand in the way of becoming the “ultra-intelligent institution” that EDUCAUSE characterizes in its [2023 Top 10 IT Issues](#).



The stakes are high: Faced with declining enrollment, changing student expectations, doubt over the value of a college degree, growth in alternative credential pathways, and other existential challenges, institutions need the technology, insight, and agility to navigate an evolving landscape. Those that innovate and harness the power of data and AI to better serve students will not only survive, but thrive.

While advances in data analytics and harnessing data for insight have sprung primarily out of corporate environments over the last five years or so, Damien Eversmann, *chief architect for education* at Red Hat, remains optimistic that higher education can regain its rightful position as a leading cradle and catalyst for innovation and experimentation, particularly as artificial intelligence and machine learning advance virtually every field of research.

## Unpausing Progress

Data and analytics continue to rapidly transform higher education, especially in the areas of student engagement, IT operations and cybersecurity. When a recent *Campus Technology* survey asked what strategic areas institutions have transformed or improved the most thanks to data and analytics, those aforementioned areas garnered the most responses, followed closely by instruction and recruitment.

Yet institutions have only started to scratch the surface when it comes to truly realizing data’s potential, and higher education has some catching up to do compared to industry and corporate America, Eversmann said. Some delay can be attributed to academia’s shift in focus as institutions buckled down to weather the pandemic and keep things operational for students, faculty, and administrators. But the pandemic is not solely to blame: Siloed data and data governance remain some of the top hindrances to modernization, Eversmann observed, and other modernization proponents agree.

“There are a lot more controls that need to be put into place around the data in academic institutions, and I think that’s where we struggle right now – in creating the ability to share while maintaining controls that in some cases are very unique to academic institutions but need to be in place,” stated Eversmann.

## Enter Ultra-Intelligent Institutions

In their Modern Framework for Institutional Analytics, published by Educause, Ithaca College’s David Weil, Casey Kendall, and Rob Snyder outline eight guiding principles to assist in laying the foundation required to use data for actionable insights across an entire institution, no matter the constituent. Institutions can follow those principles to successfully execute key data competencies, mature their data and analytics programs, and fully leverage actionable information that quickly and accurately informs decision-making.

Eversmann agrees that the first step to establishing an ultra-intelligent institution is ensuring data policies are well defined: “Almost always, those policies are going to include data protection, data security, data transfer, where your primary storage locations are, where the system of record is for each type of data, and all of those things require implementation. One of the

### Modern Framework for Institutional Analytics



Source: Modern Framework for Institutional Analytics; David Weil, Casey Kendall and Rob Snyder, Feb. 2023

biggest things we're seeing about data science is that the tools are constantly changing very quickly and it's impossible for all but the largest institutions or largest corporations to really have a fully 100% self-managed data strategy."

On the technology side, leaning into the concept of the hybrid cloud marks another critical, foundational component of an ultra-intelligent institution, Eversmann advised.

"There will be some things that are maintained locally, probably because of privacy regulations, but many others will be pushed to the cloud, where it's more nimble and we can more quickly update the toolsets," he said.

Not only are institutions immersed in the era of big data, they're also fully part of the era of edge, Eversmann said.

"We've gone from having people manually collecting data to having hundreds and thousands, in some cases



hundreds of thousands, of sensors spread around constantly inundating us with data. So when we talk about edge, we're really talking about a data issue. We're pushing that **processing out to the edge** so that we can sift through that data more effectively and more efficiently. With the amount of data that's being collected, we need to process it at the edge. We need to have the tools, the capabilities, the data science closer to the edge so that we get information faster and more efficiently."

## On the Bleeding Edge

As higher education dips its toes into the bleeding edge of machine learning capabilities, where systems themselves pick up data trends and learn how to make sense of or automatically adjust based on those trends, IT leaders also have an opportunity to advocate required culture shifts and lead higher ed to leap-frog commercial enterprise and advance the space.

The previously cited *Campus Technology* survey also asked respondents to name up to three barriers to their institutions' fully shifting from evaluation/analysis to data-informed strategic planning. The top barrier cited was institutional culture, followed by lack of resources and limited funding for required tools and resources.

"The culture of modernization is an acceptance that things change really fast and things are going to be coming at us all the time," Eversmann said. "We need

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to accept those changes and be willing to roll with the punches, and be willing to implement those changes. That just needs to be part of what we do, part of our culture. If you don't instill that culture of continuous modernization, no amount of rules for data sharing or governance are going to change anything."

He added, "This doesn't mean that you're constantly rebuilding your data center, but that you're willing to

accept that these different pieces are not static; they're always going to change. There will always be newer or better versions of things and new ways of approaching data analysis.

"Education has always been the bleeding edge; where the most significant research has happened. In the last several years, the private sector has completely embraced this new world. Corporate researchers are constantly creating new practices and methods for the processing and analysis of data. I, personally, would like to see more breakthroughs in AI and ML come out of higher ed again."

## Foundations for Transformation

The culture of collaboration and data sharing advanced by Eversmann and EDUCAUSE is a non-negotiable requirement for forcing the data-forward or data-first shift higher education now must navigate.

"Good ideas can come from unexpected places, and you need to be open and willing to accept those ideas. What has happened in academia in the last five or ten years is a kind of siloization where administration does things their way and research does things their way, but I think those two parts of the organization could learn a lot from each other. There's so much that could be shared. That's the general direction that people need to go. The only way any institution is going to be able to wade into the era of data is if we make as much data available to our entire institution as possible," Eversmann said.

## Advancing MLOps

The push to incorporate machine learning to augment operations has already begun, whether through triggering automation based on information coming from other systems or where configuration changes can be implemented based on system failures.

"MLOps represents the way operations deals with that constant flow of data, and transforms data to the information needed to make timely changes and ultimately advance their core knowledge," Eversmann said.

"Most of these changes come from the collection and processing of that data and all of that happens on the infrastructure. Whether that's in my data center or on IT infrastructure that I'm leasing from the cloud, it's IT

## Data and Analytics Maturity Model

Gartner's four-quadrant Data and Analytics Maturity Model illustrates how institutions can begin to leverage reporting and analytics, no matter the department or user role.



### STRATEGIC

#### Strategic Reporting

Assessing, Evaluating  
"How did we get here?"

#### Strategic Analytics

Planning, Predicting, Testing  
"How do we move forward from here?"



### OPERATIONAL

#### Operational Reporting

Counting, Observing, Measuring  
"Where are we?"

#### Operational Analytics

Understanding  
"What does it mean to be here?"

infrastructure and that's the scaffolding that we're going to build it all on. IT operations needs to be prepared to host AI/ML tools or to expand out to a hybrid cloud, because these are the steps to adopting this data-forward, data science way of thinking about the world. IT should advocate for this thinking. It's all about data, information and knowledge and moving those around – and IT is at the core of that."

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