5-2013

Top-Ten IT Issues, 2013: Welcome to the Connected Age

Susan Grajek

David Rotman
Cedarville University, rotmand@cedarville.edu

Follow this and additional works at: https://digitalcommons.cedarville.edu/administration_publications

Part of the Computer Engineering Commons, and the Education Commons

CENTENNIAL LIBRARY
CEDARVILLE UNIVERSITY

Welcome to the Connected Age

Top-Ten IT Issues, 2013

By Susan Grajek and the 2012–2013 EDUCAUSE IT Issues Panel
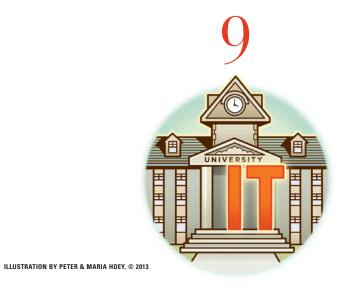
The EDUCAUSE IT Issues Panel has identified its annual top-ten IT issues for higher education. This year's issues reflect the increasing interconnections among external forces, institutional strategic priorities, and information technology in higher education.

ILLUSTRATION BY PETER & MARIA HOEY, © 2013

The boundaries between academia and the rest of the world have never been more porous. These external forces are shaping the strategic priorities of higher education institutions.

External Forces

Technological innovations occurring in the consumer space, e-learning, and middleware, software, and infrastructure are bringing to higher education institutions new personal devices, applications, and environments; new options for developing, sourcing, managing, and delivering enterprise applications and services; and new opportunities and source materials for designing, delivering, and taking courses. Advances in data- and text-analysis software, data visualization, processing, and storage are making it possible to easily ask and answer increasingly more complex questions with data.

The enduring global recession and fitful recovery have made arguably permanent changes to the economics of higher education. Moody's 2013 outlook for *all* of higher education is negative. All revenue sources—from tuition, state appropriations, research, and endowments—are "strained." Moody warns that "the US higher education sector has hit a critical juncture in the evolution of its business model" and that most colleges and universities "will have to lower their cost structures to achieve long-term financial sustainability and fund future initiatives."[1] Along with changes in the economy, student demographics have also altered: more students are part-time, older, and non-residential. American Council on Education (ACE) President Molly Broad's conclusion for higher education is that "business as usual is not in the future cards and we must innovate."[2]

Business practices have been evolving as well, and those practices are increasingly viewed as both foundational to any well-run enterprise and highly relevant to higher education. Advances in and ongoing experience with process reengineering and management, continuous improvement, project and portfolio management, shared services, and service management have made these practices both more rigorous and more flexible at a time when higher education is looking for ways to reduce administrative costs without impeding the core missions of teaching and research.

New Strategic Priorities

The boundaries between academia and the rest of the world have never been more porous. These external forces are shaping the strategic priorities of higher education institutions. Four priorities in particular are widespread and highly pertinent to information technology:

1. *Contain and reduce costs*. The bleak economic outlook and reduced funding sources are making it imperative to reduce or at the very least contain the growth of costs. Efficiencies are sought, and business best practices are often viewed as the best path to achieving efficiencies.

2. *Achieve demonstrable improvements in student outcomes*. The practice of measuring, improving, and reporting student outcomes is moving from highly desirable to imperative. The window of opportunity for colleges and universities to shape how they define, measure, and improve student outcomes—rather than react to external requirements—is shrinking.

3. *Keep pace with innovations in e-learning, and use e-learning as a competitive advantage*.[3] Whether driven by the explosive interest in open educational resources (OERs), most notably Massive Open Online Courses (MOOCs), or by explorations in using technology to develop and implement new academic credentialing models like badging and competencies, presidents, chancellors, and provosts are eager to use technol-

ogy to help inform and transform postsecondary education.

4. *Meet students' and faculty members' expectations of contemporary consumer technologies and communications*. Students and faculty not only expect that they will be able to use their smartphones, tablets, and consumer-based apps in their academic work but also expect that their institutions' services will work as elegantly and effectively as commercial services.

These strategic priorities are achievable, thanks to intensifying connections among data, systems, processes, and services. For years, higher education institutions have been building systems that gather, process, and report institutional data on siloed functions such as finances, human resources, facilities, research activities, and student performance. Institutions have created siloes of themselves as well, rarely seeking to connect their data, systems, processes, or services with those of other institutions. It is only by connecting these siloes—within and across institutions—that we will be able to achieve our institutions' common strategic priorities.

Internal Transformations and Disruptions

All these roads lead to information technology. As the thinking goes, costs can be lowered by automating reengineered business processes and moving applications to outsourced, open source, or cloud solutions. Information technology can enable state-of-the-art analytics with mature data warehouses and advanced business intelligence systems that provide real-time and accessible reporting, dashboards, and data visualizations as well as systems that provide just-in-time advice and alerts to enable students and their

advisors and instructors to take action to improve performance or enable administrators to optimize services and processes. Information technology can help shape and implement new e-learning strategies.

Whether we use the term *disruption, transformation, opportunity,* or simply *change,* the impact on IT departments and staff is enormous. IT organizations are scrambling to devise new strategies for security and support in response to explosive uses of data and the consumerization of information technology (and, with changing demographics and e-learning strategies, the consumerization of higher education). CIOs are struggling to fund, resource, and organize the numerous and simultaneous new initiatives. And IT managers and staff are trying to adapt their roles and skills to an entirely new environment.

Welcome to the Connected Age

Higher education, meet the business world. Information technology, meet the consumer. Faculty, meet OERs. Siloed institutions, meet cost-cutting legislatures and financially strapped students. From every vantage point, independence is giving way to interdependence. Underlying all of this is the influence of information technology in multiplying connections among people, data, processes, and systems.

EDUCAUSE President and CEO Diana Oblinger has identified higher education as entering a new *connected age.* In the March/April 2013 issue of *EDUCAUSE Review,* she noted: "Higher education has always been about more than information, no matter how quickly that information can be disseminated or how much of that information can be stored. Our institutions have always been communities driven by connections—connections among faculty, students, research, education, disciplines, communities, and the institutions themselves. In the connected age, it doesn't matter where the information is, where the student is, or where the faculty member is. What matters is the value that comes from the connection. . . . In the connected age, data, collaboration tools, and communities can come

2012–2013
EDUCAUSE IT Issues Panel Members

Morris W. Beverage, Jr.
President
Lakeland Community College

Paul Bishop
Vice President for Information Technology
Santa Barbara City College

Ritchie Boyd
Academic Technology Specialist
Montana State University

Kelley L. Bradder
Vice President for Information Services
Simpson College

Paul Campbell
Director, Information Technology
Australian Catholic University

John C. Cavanaugh
President and Chief Executive Officer
Consortium of Universities of the Washington Metropolitan Area

Charles E. Chulvick
Vice President for Technology, Assessment, and Planning
Raritan Valley Community College

Diane Dagefoerde
Chief Information Officer, Arts and Sciences
The Ohio State University

John Dixon
Chief Information Officer
Francis Marion University

Joe Gargiulo
Chief Information Officer
Southern Methodist University

Joanna Grama
Portfolio Manager
EDUCAUSE

Rebecca Gray
Executive Director and Chief Information Officer, Information Technology Services
Tarleton State University

Jose-Marie Griffiths
Vice President, Academic Affairs
Bryant University

John D. Hermes
Vice President for Information Technology
Oklahoma Christian University

David R. Hoyt
Chief Information Systems Officer
Collin County Community College District

Tanya Joosten
Director (Interim), Learning Technology Center
University of Wisconsin-Milwaukee

Butch Juelg
Associate Vice Chancellor, Technology Services
Lone Star College System

Rebecca L. King
Associate Vice President for Information Technology
Baylor University

Michelle Kozlowski
Associate Vice Chancellor
West Hills Community College District

John D. Lawson
Vice Provost and Chief Information Officer
Western Washington University

Michael McPherson
Associate Vice President and Deputy Chief Information Officer
University of Virginia

Mur Muchane
Executive Director of Information Technology Services
Davidson College

Loretta Parham
Chief Executive Officer and Library Director
Robert W. Woodruff Library of the Atlanta University Center

Judith Pirani
(consultant)
President
Sheep Pond Associates

David L. Rotman
Chief Information Officer
Cedarville University

Raymond E. Schroeder
Associate Vice Chancellor for Online Learning
University of Illinois at Springfield

Bob Solis
Vice President and Chief Information Officer
University of Massachusetts System Office

Nadine Stern
Associate Chief Information Officer for Operations and Planning
Princeton University

John J. Suess
Vice President for Information Technology and Chief Information Officer
University of Maryland, Baltimore County

Joseph Vaughan
Chief Information Officer and Vice President for Computing and Information Services
Harvey Mudd College

Ray L. Walker
Associate Vice President for Information Technology and Chief Information Officer
Utah Valley University

Bo Wandschneider
Chief Information Officer and Associate Vice President
University of Guelph

Christopher Watts
Director, Newell Center for Arts Technology
St. Lawrence University

Sue Workman
Associate Vice President
Indiana University

Barbara Zirkin
Associate Dean, Distance Learning
Stevenson University

together in ways never before possible. . . . Technology makes the connected age possible."[4]

The top-ten IT issues of 2013 illustrate these growing connections and our current responses to them. Some issues most clearly reflect external forces and how those forces are shaping institutional strategy. Some issues focus on the ensuing internal transformations and disruptions. Taken as a whole, however, this is a story of higher education's first steps into the connected age.

ISSUE #1:
Leveraging the Wireless and Device Explosion on Campus

Not long ago, higher education institutions were recognized as leading-edge if they were actively pursuing one-to-one computing initiatives to ensure that each student had access to computing resources and, increasingly, to the Internet. Now it seems that having only one device that can access the Internet is an exceptional situation. For example, Ohio University reports that the average student brings two devices to campus, and Cedarville University's unpublished logs show that Internet access on any given day can come from more than 9,000 different devices on a campus with a student and employee population of less than 4,000.[5] The 2013 EDUCAUSE Center for Applied Research (ECAR) study on the Bring-Your-Own Device (BYOD) trend estimates that students will bring three to four Internet-capable devices to campus in the fall of 2013.[6] CTIA, the wireless industry trade association, confirms this trend on a broader level, reporting in its 2012 semi-annual wireless industry survey that in Q2 2012, the number of cell phone devices in use in the United States exceeded the country's population. In addition, the data traffic for the previous twelve months grew 104 percent over the prior year.[7] This data traffic represents only a portion of the total traffic from these devices, since most data-enabled cell phones can also access the Internet over wi-fi connections.

Now that faculty, staff, and students all have these portable devices, they expect to use them. Before, IT organizations had to address network coverage, but the pure density of devices on campus and their bandwidth requirements cause new challenges. Furthermore, users may upgrade their devices several times in a single year, taxing IT organizations' ability to keep up with new devices, versions, or features. With formalized IT "refresh rates" now being thrown out the window and with new devices and software being developed every day, IT organizations struggle in choosing with whom and with what to align.

Institutional IT leaders must determine how to leverage the wireless and device explosion to advance the educational mission. Today's mobile devices no longer just provide access to contacts and calendars; they are powerful computing devices that are capable of much more. Faculty, staff, and students want to consume all the content they need—ranging from campus maps to class schedules to campus news and alerts—when they want

Top-Ten IT Issues, 2013

1. Leveraging the wireless and device explosion on campus

2. Improving student outcomes through an approach that leverages technology

3. Developing an institution-wide cloud strategy to help the institution select the right sourcing and solution strategies*

4. Developing a staffing and organizational model to accommodate the changing IT environment and facilitate openness and agility

5. Facilitating a better understanding of information security and finding appropriate balance between infrastructure openness and security

6. Funding information technology strategically*

7. Determining the role of online learning and developing a sustainable strategy for that role

8. Supporting the trends toward IT consumerization and bring-your-own device*

9. Transforming the institution's business with information technology*

10. Using analytics to support critical institutional outcomes*

*Also one of the 2012 Top-Ten IT Issues

"Students are carrying a cell phone—many with two—a tablet, and a laptop, and they may be also using a campus device at the same time. Not only are we faced with providing bandwidth to handle all these devices but we are challenged by the pure density of devices on campus."

—BUTCH JUELG
Associate Vice Chancellor,
Technology Services,
Lone Star College System

it, where they want it, and on whatever device they may be using at the time. Providing this content to them is no longer an extra resource; it is a requirement.

Strategic Questions for *Leveraging the wireless and device explosion on campus:*

- Is the IT organization's mobile strategy aligned with the overall institutional strategy?
- Is the institution's student population in a socio-economic strata that is yet to join the multiple-device environment? If so, does the institution have an obligation to provide the levels of access that are available to other, more advantaged students?
- If the institution is distributing devices to each student, is it time to reconsider that practice?
- Is the institution's instructional model being affected by the explosion in the variety and number of devices? Should it be?
- Will the institution have adequate wireless access and Internet bandwidth to address wireless device density? Is ubiquitous network access a baseline or a highly desirable requirement?
- Have institutional and IT leaders considered the security implications of this pervasive access to institutional resources and data?
- How can the IT organization provide

the tools to ensure that content developers get their information out to the masses?
- Are the institutional web resources accessible in a suitable format on mobile devices? Is the site design responsive to the differing sizes and capabilities of various devices?
- Should developers deploy custom mobile applications?

In 2012, 47% of responding institutions reported that a majority of campus open areas were covered by wireless network access.

—EDUCAUSE Core Data Service 2012

ISSUE #2:
Improving Student Outcomes through an Approach That Leverages Technology

Student academic outcomes continue to gain importance in higher education. Assessment of student outcomes is increasingly a focus of accreditation agencies. State and federal governments are expecting institutions to deliver a low-cost education with degree attainment in four years. Student learning outcomes are also being used increasingly as benchmarks for performance funding at system, institution, and department levels. This approach replaces input measures such as enrollment. This increased focus on student outcomes is generating interest in and development of technologies to measure, manage, and improve student outcomes.

There are at least two broad ways to leverage technology to assess and improve student outcomes. In addition to analytics and automated advising tools, technology can be employed in the design, creation, and delivery of the learning experience to the student. And certainly there is an interplay between these two.

It is important to keep in mind that

we can apply technology to learning in many instructional venues—face to face, blended, or totally online—with beneficial outcomes. A well-designed course might have online or computer-mediated components that include embedded content review and assessment features to guide students through an iterative process toward mastery, rather than students simply testing out and moving on at whatever performance level they attained. Not only does the student have a better outcome by identifying and strengthening weaknesses, but the instructor, through an examination of individual learning paths and outcomes, can improve the course by addressing areas where a majority of students struggle with content.

Cloud-based tools like Taskstream (https://www1.taskstream.com/) are focused primarily on accountability. The analytics that are built into some learning management systems—for example, Desire2Learn (http://www.desire2learn.com/)—provide very powerful platforms for faculty and administrators to track student learning and to create the documentation necessary for accreditors. Additional tools that build on these learning analytics platforms include intrusive academic advising tools that send e-mail notices when students trigger certain academic performance metrics (e.g., missed classes, poor exam performance, too many errors during mastery attempts in learning). Data

mining that uses campus student information systems, campus portals, and learning management systems can support these early alert and intervention strategies, as well as provide a bigger picture regarding overall student success (e.g., retention, GPA, persistence, completion). The data can provide insight into potential problems early on and can help to identify strengths and weaknesses—opportunities for improvement—in areas needing attention.

None of these exciting advances will succeed without preparing, supporting, and listening to faculty. Institutions that invest in the technologies must make parallel investments in faculty development and ongoing support. Other challenges include protecting the privacy and security of students' information while putting it to greater use. Beyond solutions that support advising, assessment, and pedagogy, additional technologies that may directly or indirectly influence student outcomes include cloud-based services, open educational resources, and social media.

Cloud–based Services: G-mail, Google+, iTunes, Twitter, YouTube, and other web-based media sites are becoming the standard repositories for educational content. Students are not only the consumers but also the contributors to an ever-increasing body of knowledge. Challenges include taking control out of the purview of the campus IT department and dealing with a lack of coherent policy to accommodate the extended community (e.g., intellectual property rights, privacy issues, quality).

Open Educational Resources (OERs): MIT OpenCourseWare, Khan Academy, iTunes U, MOOCs, and other OER repositories provide massive amounts of quality online learning materials that can be leveraged to supplement and assist the classroom regardless of delivery modality. Such resources are being used to support a higher level of assistance to students who are entering college for the first time or returning to school for retraining. Challenges include helping faculty in the identification and selection

> "It's not enough to identify students at risk. To be successful, we need to ensure follow-through, so that students are provided the support they need in order to remediate problems and connect with the resources they need to succeed."
>
> **—MORRIS BEVERAGE, JR.**
> **President, Lakeland Community College**

of quality resources, or in the creation of new ones, in support of their course learning outcomes.

Social Networks: Social networks (e.g., Facebook, Twitter, Pinterest, Google+) offer the opportunity to create a sense of connectedness for students at the course, program, and institutional levels. Research shows that students with a sense of connection to their campus, program, and classmates are much more likely to persist and succeed in their academic pursuits.

Strategic Questions for *Improving student outcomes through an approach that leverages technology*:

- Is the institution looking at the quality and value of the student advising process?
- Is the institution starting to seriously evaluate course design, delivery, and outcomes-based assessment in any courses, whether face to face or online, and the affordances offered by technology?
- Does the institution use a common form of evaluation (e.g., Quality Matters or internally constructed instruments) to evaluate the quality and design of technology-mediated courses?
- Does the institution have the technologies, staff expertise and levels, facilities, and funding required to improve student outcomes?
- How can technology and tools improve faculty buy-in and perspective regarding outcomes assessment?

- Does the institution take advantage of tools embedded in learning management systems to track student learning? How does the institution translate student learning data into program review and accreditation review processes?
- Does the institution provide adequate and timely instructional design assistance and services to encourage both students and faculty to leverage technology in the classroom? Does it take into account current and emerging technologies that are available to faculty?
- Does the institution have a mechanism in place that encourages or requires faculty to review the various forms of assessment data available and take an iterative approach to course improvement?
- Do the institution's reward systems for faculty encourage or impede faculty use of technology to optimize their instructional materials and techniques?
- What are the policy or governance implications for using student information in new ways and does existing policy and governance facilitate or impede these efforts?

ISSUE #3:
Developing an Institution-Wide Cloud Strategy to Help the Institution Select the Right Sourcing and Solution Strategies

Hardly a week goes by without another story about cloud computing. Cloud computing made the list of Gartner's top-ten strategic technology trends for both 2011 and 2012,[8] and cloud computing is one of the fastest-changing aspects of the technology industry. In 2009, ECAR released a research bulletin titled "Demystifying Cloud Computing for Higher Education." At that time, 49.8 percent of campuses reported at least one Software-as-a-Service (SaaS) application.[9] Cloud computing, when

done properly, can enable institutions to be more agile and deliver new services faster and with fewer or lower up-front costs. As Brad Wheeler, Vice President for IT and CIO at Indiana University, has noted: "The real potential of cloud computing . . . is to improve the economics of higher education through economies of scale and leverage of IT services that are beyond the grasp of even large institutions."[10]

The EDUCAUSE publication "What Campus Leaders Need To Know About Cloud Computing" lays out a definition that looks at cloud computing as a computing model in which technology resources are delivered over the Internet.[11] In September 2011, the National Institute of Standards and Technology (NIST) released a special publication, NIST SP 800-145, that defines and discusses cloud computing. In the NIST definition, cloud computing has five essential characteristics: on-demand self-service, broad network access, resource pooling, rapid elasticity or expansion, and measured service. NIST also lists three "service models" (software, platform, and infrastructure—or SaaS, PaaS, and IaaS) and four "deployment models" (private, community, public, and hybrid) that together categorize ways to deliver cloud services.[12]

In 2012, higher education, through the Internet2 NET+ initiative (http://www.internet2.edu/netplus/cloudservices.html), began embarking on a more collaborative approach to cloud computing. In this approach, higher education institutions identify cloud service providers, work together to develop fair legal and business contracts, use common provisioning techniques, and share lessons learned on implementation and deployment. The NET+ effort has vendors and community organizations moving beyond SaaS to the other two NIST service models of PaaS and IaaS. Some service models, such as platform (PaaS), are easier to deploy. An example of a platform service is e-mail outsourced to Google or Microsoft Live. Other service models, such as infrastructure (IaaS), may require more planning and integration before starting.

As is often the case, successful technology adoption requires an alignment of people, processes, and technology. The 2010 *EDUCAUSE Review* article "Looking at Clouds from All Sides Now" highlighted many of the key strategic questions and challenges to cloud computing.[13] These issues focus mostly on the people and process issues of institutional risk, security, contracts, and staff skills, to name a few. Higher education institutions will need to create guidelines for anyone acquiring a cloud service and will need to educate those who are concerned about the use of cloud providers. The technology issues focus mainly on security, integration, and enterprise architecture, including such basics as data security, data location, who has access and to what, whether or not data is encrypted at rest as well as in transit, who has access to the encryption keys, and recovery point objectives and recovery time objectives (RPOs and RTOs) in the event of a disaster.

Strategic Questions for *Developing an institution-wide cloud strategy to help the institution select the right sourcing and solution strategies:*

- What is the inventory of cloud services in use? Is there a process for review of all cloud services by the legal, procurement, and IT departments?
- Has the IT department reviewed the Internet2 NET+ services to leverage best practices in the community?

- How does the IT department evaluate the risk of using cloud services, and is there standard language for contracts that cover security, risk, and service levels? Does the IT department have a strategy for exiting cloud services?
- Does the institution have a data-classification strategy that explains what data can and cannot be shared in the cloud?
- What is the IT department's strategy for integrating cloud services into the enterprise architecture?
- What IT security measures and policies need to be in place?
- What are the data management and recovery strategies?
- How are accounts de-provisioned after someone exits the institution?
- What guidance do faculty, staff, and students receive for the use of cloud services? For example, can they use the free storage options available to the public? Do technical and functional staff have the expertise to adequately evaluate and implement new cloud services successfully? What new tools and processes are required of IT support staff?
- What is the usage structure: fully cloud in the sense of on-demand scalability; metered delivery; or something more traditional (like an annual fee or a per-FTE fee)?

ISSUE #4:
Developing a Staffing and Organizational Model to Accommodate the Changing IT Environment and to Facilitate Openness and Agility

Last year, the EDUCAUSE IT Issues Panel identified *Updating IT professionals' skills and roles to accommodate emerging technologies and changing IT management and service delivery models* as the number-one IT issue. Staffing was an important issue again this year, but the focus now is on the organizational model required to address the impact of the changes that are once more sweeping the IT world. Cloud computing, BYOD, governance, analytics, efficiency drives, and information security are all placing new demands on IT organizations and staff.

Many of these new demands stem from the solutions chosen for the institution and from the level of support provided for each of them. The main ERP or LMS system is in the center of a hub, with dozens of other systems supporting or enhancing each one. New, potentially more cost-effective solutions and service architectures are emerging, and these require new organizational structures and staff roles. Similar changes are affecting academic computing. More traditional learning technologies in physical learning environments—computer labs, computer classrooms, libraries—must continue to be supported, while new learning technologies must be explored and integrated into both physical and virtual learning environments where the components are dynamic and evolving rapidly.

To respond well to the new IT environment, an IT organization needs to be resilient and ready to explore and take on new challenges, all on increasingly short timelines. The IT organization (not just the CIO!) needs to lead without getting too far ahead of the institution by staying cognizant of innovations but keeping the lights on and the trains running. As solution providers change their underlying infrastructure, IT staff must adapt to those changes to maintain a stable platform for the institution. As IT organizations move to outsource more solutions, the IT staff are assuming new roles and forming new units to emphasize service management and strategy. Faculty, staff, and students are bringing new devices, environments, and apps to their academic and administrative work and are looking to the IT organization for help in integrating these tools with existing enterprise systems.

Cost-cutting or containment measures often call for elimination of redundancies, and distributed IT organizations are targets for consolidation and centralization. Consolidations can change the IT working culture: whereas smaller IT units tend to attract generalists who can play several roles, larger IT organizations tend to have more specialist and fewer generalist roles.

All these changes are potentially disruptive to the IT workforce. Training and skill development of IT staff will address some of the dynamic organization needs, but institutions must be ready to explore alternative skill-sourcing models that are more fluid and can respond better to the ebb and flow of both physical and virtual environments and the technologies they employ. IT organizations are learning to take advantage of any opportunity to shift and retrain resources as the landscape changes, including leveraging temporary contract workers for specific initiatives. A key question is whether the IT organization can shift from a focus on being the experts to a focus on being "accomplished novices"[14] who collaborate with their constituents to find the right IT solutions for a given need.

Strategic Questions for *Developing a staffing and organizational model to accommodate the changing IT environment and to facilitate openness and agility*:

- To what extent is the CIO's ability to address staffing and organizational challenges limited or facilitated by the institutional culture as a whole?
- Among the IT organization's goals, which most highlight underdeveloped parts of the organization? What specific tactics are being employed?
- How does the IT organization control the proliferation of applications and therefore the support needed? If a strategy of control isn't feasible, what service level agreements are in place to clarify support boundaries?
- Does the IT organization have a sourcing strategy and roadmap that includes accounting for the impact on staff? What strategies are planned for potential gaps between current staff skills and roles and emerging ones: re-training, attrition, performance management, restructuring?
- What are the capacity and capability gaps and strengths of the current IT workforce?

> "We don't have the kind of flexibility or dynamic ability to adjust staffing in a way that aligns with our new mission. That is part of the conundrum. We are staffed to support our mission, but when we see a new mission coming, we are unable to staff up due to financial pressures. We don't have the right people to forge into that new mission."
>
> —**JOHN J. SUESS**
> **Vice President for Information Technology and Chief Information Officer, University of Maryland, Baltimore County**

- How might non-IT staff be cultivated to provide certain types of IT services or functions (e.g., analytics and reporting, instructional technology provisioning, vendor management, process reengineering)?
- How might contractors or vendors be engaged to address specific IT initiatives?

ISSUE #5:
Facilitating a Better Understanding of Information Security and Finding Appropriate Balance between Infrastructure Openness and Security

Higher education IT organizations are tasked today to guide their institutions in the quest to safeguard data, information

systems, and networks; protect the privacy of the higher education community; and ensure that information security is an integral part of campus activities and business processes. At the same time, IT organizations must acknowledge the shared governance, equity, diversity, and access values that define higher education.

As a result, over the last decade cybersecurity has regularly been identified as one of the top issues facing higher education IT organizations. This is not surprising: cybersecurity risks and threats are escalating, and colleges and universities are faced with the challenge of increasing the resources allocated to cybersecurity. The result is that today, IT organizations must prioritize where they focus their resources and effort through a combination of risk-management programs and data-classification processes.

Institutions that don't have a risk-management program in place should

look at the work of the Higher Education Information Security Council (HEISC), which has developed the *Information Security Guide: Effective Practices and Solutions for Higher Education,* a compendium of information providing guidance on effective approaches to the application

of information security at institutions of higher education.[15] HEISC partners closely with the Indiana University Research and Education Networking Information Sharing and Analysis Center, or REN-ISAC (http://ren-isac .net/). REN-ISAC is a closed community of security professionals and is an important resource for higher education. Institutions pay a small fee and can nominate their primary security officer for membership. Through a community of over 1,000 security professionals, REN-ISAC provides the higher education community with closed-discussion e-mail lists, daily security watches, and general threat and remediation information.

Two of the core values of higher education are enabling community and sharing information. As a result, the most important security tool available to institutions is the collective intelligence of the community. Ensuring that technology professionals at an institution leverage the resources of the community—the *Information Security Guide,* EDUCAUSE conferences, REN-ISAC, and the willingness of institutions to help one another—is the most powerful way that institutions can improve security.

Finally, higher education institutions need a process to deal with assessing the security issues stemming from new and evolving technologies: cloud computing, BYOD, and the consumerization of technology, to name a few. Faculty and staff use personal mobile devices to access university e-mail and resources. Faculty, staff, and students use services such as Dropbox and Google Docs for storing at least some institutional data, particularly if the institution cannot offer them comparably easy-to-use options. How can IT organizations protect that data? More collaboration and education is necessary to reduce the tension between academic openness and security and to find innovative ways to raise the academic community's awareness of the need for security while promoting institutional principles. Faculty, for the most part, will respond cooperatively and responsibly if informed of the risks and opportunities. These technologies have the potential to make a profound difference in

"Because of the nature of the academy, balancing openness and security has always been a challenge. The now-pervasive nature of technology enabled by connectivity, devices, and the use of these mediums to socialize compounds security issues and intensifies the focus to maintain the balance, forcing institutions to dedicate more technical resources to strengthening information and infrastructure security. Maintaining the balance as perceived by those who are responsible for protecting institutional data and resources and those who use them often differs a great deal."

—JOHN DIXON
**Chief Information Officer,
Francis Marion University**

higher education, and it is important for IT leaders to not let security stifle innovation.

Strategic Questions for *Facilitating a better understanding of information security and finding appropriate balance between infrastructure openness and security:*

■ Does the institution have a formal risk-management process to identify the most-pressing risks and prioritize resources?

■ Does the institution have a process for data classification to identify and classify sensitive data?

■ Does the institution regularly review the HEISC *Information Security Guide* and other resources as part of developing its security program?

■ Is the institution a member of REN-ISAC? If so, is the person responsible for security actively participating in

REN-ISAC and engaging with the community of higher education security professionals?

■ Does the institution have an Information Security Officer and/or security staff who can adequately (perhaps eloquently) communicate security risks and issues to campus clients and executives?

■ Are campus information security policies/practices/guidelines regularly (annually?) reviewed for continued appropriateness and reasonableness?

■ How do security practices inhibit collaboration and the implementation of the newest applications, particularly those using social media?

■ How does the IT organization create a community of well-informed, vigilant users who question every e-mail request and value the efforts of keeping authentication credentials private and secure?

■ Which metrics should be used to measure the infiltration and success of security-awareness programs, and are they in place and being used to continuously assess and improve information security?

In 2012, 37% of responding institutions participated in REN-ISAC.

—EDUCAUSE Core Data Service 2012

ISSUE #6:
Funding Information Technology Strategically

At times, higher education leaders think of information technology in isolation, when in fact information technology is a service to the college or university just as are finance and accounting, human resources, student administration, the faculty and academic departments, and other areas. To understand how to position information technology, as well as all other institutional services and departments, institution leaders need to spend time focusing on their operating model, which drives how the institution delivers

goods and services to its target customer base. The operating model is determined by the existing level of business process integration and standardization and plays an active role in how an institution decides where to place its funds strategically.

An institution's operating model, as well as its goals and priorities, should drive IT priorities and solutions and in turn IT investment. For example, IT investment can be both a cost center and a revenue generator if viewed broadly. Understanding how each type of investment interacts with another and aligns with institutional goals is critical to smart decision making. Equally important is transparency in IT budgets and costs, especially with respect to costs of IT services. Many IT organizations are considering moving to service- or activity-based costing to enable IT and business leaders to understand the fully-loaded cost of each IT service. Understanding what services truly cost helps an institution consider important short-term and long-term cost-benefit trade-offs as it determines how to source and fund new strategic IT initiatives and how to compare the costs and value of current and alternative sourcing options.

Another key factor in making strategic investment decisions is having a transparent, inclusive governance structure for prioritizing and overseeing IT investments and for evaluating ROI or value generated once the investments are made.

A final consideration in funding information technology strategically is a focus

"Strategic investment in IT depends critically on having a strategic plan for campus IT. Too many campuses make investment decisions on the basis of chasing technology (e.g., devices) without determining where the institution should be heading."

—JOHN C. CAVANAUGH
**President and Chief Executive Officer,
Consortium of Universities of the
Washington Metropolitan Area**

on investment portfolio balance, again in accordance with the institution's operating model, strategic goals, and objectives. Institutions should take stock of where their current IT investments reside on the spectrum from baseline operations through organizational growth to transformative and strategic. IT spend per institutional mission (most commonly teaching and learning, research, and community service, with administration, although not a mission, often viewed as a fourth supporting category) is another important dimension of the IT investment portfolio. The EDUCAUSE Core Data Service estimates that 50 percent or more of the IT budget may be in support of administrative information technology, with far fewer resources devoted to information technology for teaching and learning or research. Many leaders are beginning to question the proportionate and absolute high costs of administrative information technology. The view of the current state, coupled with the institutional operating model, can serve as a critical driver to determine the optimal mix of mission-related and of operating, growth, and transformative/strategic IT investments.

Strategic Questions for *Funding information technology strategically*:

- Which aspects of the institutional strategic plan depend critically on robust IT systems (e.g., infrastructure, devices, software)? To what extent are those dependencies made clear in the plan and understood and supported by institutional leadership?
- How can information technology be used to leverage local campus resources (e.g., connecting with regional or system institutions, enabling collaborative back-office functions)?
- Does the institution have a technology adoption and innovation strategy that specifies the areas in which it wants to lag, lead, or pursue a middle course?
- Can the IT organization measure the fully-burdened cost of each IT service via service-based costing or a similar methodology?
- Can the institution measure its full expenditures on information technology, beyond the central IT department? Does the current distributed IT model need to be revisited to ensure the right balance between optimizing costs and service levels?
- Can the institution measure its expenditures on information technology for administration, research, and teaching and learning?
- Can the IT organization calculate the costs of its services to permit comparison with alternative sourcing options? Could alternative sourcing options free up funds to invest in IT strategic initiatives?
- Can the IT organization use ROI or NPV methodologies to assess the business case for proposed new initiatives?
- Does the institution establish and manage IT investments using a transparent and inclusive governance process?

ISSUE #7:
Determining the Role of Online Learning and Developing a Sustainable Strategy for That Role

It is broadly accepted that online learning is here to stay. The recent rise of MOOCs has many higher education institutions considering how online learning, whether massive or not, may fit into their academic ethos and how to go about supporting the design and delivery of high-quality learning experiences. The path forward for many will be an evolutionary journey as institutions ramp up their MOOC efforts in an attempt to remain competitive and protect their brands and as they examine the whole landscape of online learning. During this journey, they will ask questions about goals, audiences, and the quality of the experience.

Determining the right scope and positioning for online initiatives is important. Should online learning investments be restricted to certain niche courses and programs, or should online learning opportunities be made broadly available in deference to access and convenience for students? Is there some kind of middle ground that could be defined at campus, system, state, and consortia levels? What percentage of an institution's revenues should come from online programs as opposed to hybrid or fully on-premises offerings? What role do transfer credits from free online courses play in a student's path toward a degree?

An institution's success in online courses and programs will depend on its ability to grow and maintain such offerings and the ability of faculty to adjust to new ways of instructing learners. The current trend of blending or merging classroom and online would appear to be one of the best strategies for sustaining the precepts of online learning in post-secondary institutions. For example, the increasingly popular "flipped classroom" approach is showing increased acceptance and reported gains in helping

"The role of online learning as a sustainable strategy for postsecondary institutions rests a good deal with the ability of faculty to adjust to new ways of instructing learners."

—BARBARA ZIRKIN
Associate Dean, Distance Learning,
Stevenson University

students achieve success and thereby increasing college retention rates. A "flipped" on-campus course is often a first step toward an entirely online course or degree program, as faculty move away from what is often a purely lecture-based model of course delivery.

The rapid and highly publicized interest in MOOCs has polarized and confused the higher education community. Many believe this is a harbinger of the future of higher education, whereas others question the rationale behind, and the quality of, this online pedagogical phenomenon. Are MOOCs effectively a new variant of textbooks, destined to be vehicles for star faculty to extend their "brands" and for the community to consolidate the delivery of low-cost, high-quality content to students worldwide? What is the business model for MOOCS, and who will be the financial winners and losers: faculty, colleges and universities, or external entities? The quality of today's MOOCs is highly variable. Will instructional technologists at colleges and universities be supplanted by external groups who can produce courses with Hollywood-style production values? As MOOCs almost inevitably sink into the trough of disillusion that Gartner predicts most technologies experience, will we experience a backlash against online learning in general? One of the potential benefits of the current debate regarding MOOCs is an increase in the amount of attention many academics are paying to online courses in general and to the quality of the course

design, content, and facilitation. Any discussion regarding sustainability of online offerings is coupled to the quality of those offerings in terms of both design and support.

Many of the challenges involved in adopting online learning resemble the challenges involved in adopting any new technology. Investment in technology alone is insufficient and is likely to sabotage success. Effective change management and support for faculty are essential; faculty reaction is likely to range from eager evangelism to adamant opposition. Assessment will be a critical component of online learning programs. Many experts in pedagogy are concerned about an apparent abandonment of pedagogical theory and expertise in current online learning initiatives. Online learning programs should evaluate both the effectiveness of online learning offerings and the relative value and ROI of various learning modalities and options. Evaluations should take into account not only business goals but also faculty and student experiences and outcomes.

The addition of an online learning offering could also be seen as a strategy for sustaining a postsecondary institution overall. MOOCs (certified for credit or not) and the popularity of other open-source means to gain information represent opportunities for online course creators and faculty to develop ways to incorporate new learning modalities and technologies into existing classroom structures, potentially strengthening the on-premise learning experience.

Strategic Questions for *Determining the role of online learning and developing a sustainable strategy for that role*:

- Are faculty actively engaged in the discussion regarding the benefits and challenges of online learning for both traditional and nontraditional learners on campus and off?
- Has the institution articulated a strategy for online learning? Has it established a business plan to support that strategy and to sustain new investments?

- Does the institution have a coherent plan for identifying courses or programs that could be adapted to or created for the online venue?
- Does the institution provide adequate resources and incentives for faculty and support personnel to create and maintain high-quality online learning experiences?
- What assessment techniques are in place to evaluate changes in classroom and/or online learning strategies across the institution? Are they adequate to give good information that will sustain the initial effort?
- Can the technical capacities of the institution sustain creative and continuing change? Are students, faculty, and technical staff adequate to the task? Are classrooms, faculty, and students suitably equipped to incorporate new strategies, and are these sustainable?
- Are new initiatives seen as a fad and are thus not sustained over initial excitement and experimentation in learning?

In 2012, 75% of responding institutions provided special support services for distance education.
—**EDUCAUSE Core Data Service 2012**

ISSUE #8:
Supporting the Trends toward IT Consumerization and Bring-Your-Own Device

Access to sophisticated computing resources in today's environment is easy. With a few clicks of a mouse, anyone can establish an account providing two gigabytes or more of Internet-based storage for free. This is in sharp contrast to the situation on many campuses, where the IT organizations often provide limited resources (network storage of a few megabytes) or where resources are provided only in return for agreeing to a chargeback mechanism. In another campus

contrast, anyone—students, faculty, staff, and business units—can subscribe to sophisticated systems like CRM and ERP systems without involving any institutional IT professionals.

Consumer devices are also changing the landscape. Cell phones now routinely contain multi-gigabyte storage and run multi-core processors. Many of these devices can use campus networks, but they can also bypass the campus networks via cell phone data access. Students are coming from home environments where it is not unusual to be making simultaneous use of multiple devices: streaming video onto a TV, texting on a phone, and surfing on a tablet.

Most students have mobile devices. Today even some smartphones can connect to display devices, mice, and keyboards. With this e-text, LMS, and virtual apps and storage environment, many students are carrying in their pockets everything they need for studying and learning. Some institutions are reducing or eliminating computing labs and are instead providing collaborative study areas with comfortable seating, monitors, printers, and keyboards. Some are providing access to lab software via virtual application delivery—the lab is not a physical place anymore.

Thus higher education institutions face a situation in which their community increasingly uses Internet resources for

> "Students in traditional and non-traditional courses have already established some channels for acquiring and distributing information. It is a key question as to what level—or if at all—we want to accommodate those channels or drive all of the use into the university-sanctioned environment that we already support."
>
> **—RITCHIE BOYD**
> **Academic Technology Specialist,**
> **Montana State University**

infrastructure (storage and raw computing capability) and for services (software platforms, knowledge bases, intelligent assistants) and even for networks (cell and non-institution wi-fi). This usage is no longer confined to access via authorized (i.e., institutionally owned) channels.

This consumerization of information technology is placing an explosive demand on the wireless network infrastructure and the campus Internet connection and is creating a challenge for the IT organization to accommodate new expectations. Although many of the devices "play" quite well together in a home networking environment, the complexities of a campus networking, application, and data environment bring a host of challenges. Consumerization is changing the previous technology paradigm—in which all, or nearly all, devices and their connection to the network were controlled by the IT organization—and is requiring IT staff to shift their focus from devices to infrastructure and data. Whereas the first approach for supporting personally-owned mobile devices through MDM (Mobile Device Management) was an attempt to secure and manage the *devices*, it has now become apparent that MDM must be used to secure and protect the *data*.

Strategic Questions for *Supporting the trends toward IT consumerization and bring-your-own device*:

- Does the institution have appropriate policies in place regarding acquisition of IT services and devices and regarding responsibilities for data security on those devices?
- Does the institution have an appropriate policy on record storage (location of the storage, security of that storage) and record retention?
- Does the institution provide cell phones, tablets, and other "personal" devices to employees? Is that practice still appropriate?
- Should the institution move to a stipend-based model for employees to acquire IT services and devices?
- How can the institution minimize

support time and expense in an increasingly diverse technology environment?
- Should (could) the IT organization provide services that compare favorably with existing external offerings?
- How should the institution address data-integration issues when employees use multiple Internet-based software systems?
- Do students still require institutionally-equipped computer labs? If not, should those spaces be decommissioned or reimagined?
- How can the institution leverage the BYOD trend for financial gain?
- How far can the institution go to secure and track personally owned devices?

In 2012, 11% of responding institutions required mobile device management for personally owned devices.
—EDUCAUSE Core Data Service 2012

ISSUE #9:
Transforming the Institution's Business with Information Technology

Over the last few years, the recession has caused many higher education leaders to rethink how they do business and how they can differentiate their college or university from competing institutions. Many are turning to technology to address these challenges. Enrollments in

online learning are increasing, MOOCs are becoming more commonplace, virtualization is coming into its own, and cloud services are multiplying. IT organizations are thus changing the way they provide services. IT leaders know that as the business transforms itself, the IT organization must become a more integrated partner within the institution by having a deeper understanding of campus-wide goals and needs.

Transformation of an institution's business with information technology will be elusive for any organization that does not first acknowledge that such initiatives are not about technology but, rather, are about business outcomes and performance. The contribution of information technology to successful transformation should be defined by the role that the IT organization plays in achieving targeted business (including academic and research) outcomes and performance.

For many, having a set of defined business outcomes and performance mea-

"Higher education IT will need to change its mindset; it can't provide everything in-house any more. We need to move from 'service provider' to 'solutions architect.' It's an opportunity and a key challenge."

—DIANE DAGEFOERDE
Chief Information Officer, Arts and Sciences,
The Ohio State University

sures infers the existence of a formal institutional strategic plan. It shouldn't. All too often, IT organizations can be found treading water while they wait for the institution's formal strategic plan to appear. But industry advances in applications and technology surely wait for no one. In the absence of formal strategic plans, institutions should leverage whatever they do have—mission statements, overarching objective and goal plans, statements—to identify and respond to business goals and measures of success.

Successful transformations require good governance: a venue whereby interested and influential members of the institution can make decisions about IT investments and priorities. The venue should have a defined charter and should afford participants the opportunity to explore openly where and how information technology can positively influence, either directly or indirectly, business outcomes and performance.

Finally, and perhaps most important, institutions must have a willingness and desire for change. Institutions must be able to adopt new business processes that are often the requisite of transformative and effective technology projects. Not doing so will result in missed opportunity and will very likely bog down the institution with undue operational overhead.

Strategic Questions for *Transforming the institution's business with information technology*:

- How can innovation be encouraged in both the institution and the IT organization?
- Is there a venue for the business community to interact on the subject of information technology?
- Are the right people at that venue?
  - Does it include business leaders who are interested in learning more about information technology and exploring how the business can best leverage its investment in information technology?
  - Does it include IT leaders who understand the role of information technology in the institution

and how to communicate benefits, value, and risk to the business community?
- Does the institution have defined business outcomes and performance objectives to which information technology can be mapped? If a formal strategic plan does not exist, is there sufficient content from other institutional sources to create outcome and performance objectives?
- Is the organization willing to change business process or practice to garner effective and efficient use of its information technology?
- Is there enough organizational support, executive or otherwise, to ensure that appropriate change occurs?
- Does the institutional funding model incentivize or undermine achieving the full benefits of business transformation?

In 2012, 72% of responding institutions reported that information technology was included in the institutional strategic plan.
—EDUCAUSE Core Data Service 2012

ISSUE #10:
Using Analytics to Support Critical Institutional Outcomes

Higher education is at a critical crossroads in the United States. President Barack Obama has challenged the country to have the highest national college-completion rates in the world by 2020.[16] Presently, the United States stands sixteenth[17] and faces a multitude of challenges around student success, affordability, and access—challenges that must be addressed over the next few years if the nation is going to make traction on the larger goals. These complex problems require deeper analysis and understanding to develop appropriate public policy and management responses.

The EDUCAUSE working definition of analytics is "the use of data, statistical

"The strength of data and analytics helps us understand our past and our current state and provides a glimpse of scenarios of the future based on that past and current state. As a wise person once stated—and can be related to what data and analytics provide for us: 'If you don't know where you're going, how will you know when you get there?' "

—BOB SOLIS
Vice President and
Chief Information Officer,
University of Massachusetts System Office

analysis, and explanatory and predictive models to gain insights and act on complex issues."[18] In the 2012 ECAR research report *Analytics in Higher Education,* survey respondents identified functional areas where data is being used for analysis and prediction. The most common areas were enrollment management, finance and budgeting, student progress, instructional management, and central information technology.[19]

The higher education community is amenable to using analytics in that doing so conforms to the community's belief in scholarship. Colleges and universities are built on evidence-based scholarship and rigorous analysis. To date, however, higher education has been slower than some other sectors to apply analytics to its strategic objectives. Higher education will need to come of age and shed the long-standing belief that adopting good or leading business practice, especially if from non–higher education industries, is incongruent with its culture. Quite the contrary: given the backdrop of vast changes occurring in the world of finance and technology, it is precisely good business practice that will enable higher education to preserve the most prized and valuable aspects of its culture. The ECAR report highlighted the challenges institutions face, listing survey respondents' top-five reasons: affordability, misuse of data, regulations requiring use of data, the lack of data-driven culture, and inaccurate data.[20]

In the EDUCAUSE Analytics Sprint held during the summer of 2012, it became clear that those campuses that are successful in using analytics have built an institutional culture that values data and asks good questions.[21] Successful data analytics activities require tearing down the silos of information around a campus and encouraging cooperative analysis of the data that can, for example, improve student success and retention and reorganize campus activities to maximize gain and

reduce cost. Successful institutions build interdisciplinary teams that cut across a variety of units to work collaboratively on analytics: the leadership team and individual units ask strategic questions focused on areas in which the institution wants to improve; institutional research or the office of assessment is responsible for analysis; and the IT organization provides an infrastructure that can quickly produce meaningful data and reports. Data in and of itself does not make decisions; people do. Once the key findings are identified, these can and should be used to develop actionable strategy that is monitored by predictive reports and dashboards to track progress and make any necessary adjustments. Good data and analytics are meant to inform and guide in a continual assessment of how to traverse today's environment.

It is the successful intersection of information technology and information ownership that becomes the important factor in whether campus data analytics efforts yield usable results. Too often, that intersection does not take place, and data analysis becomes the limited world of the few, not permeating the campus community as an ongoing activity more than every five or ten years during the cycle of reaccreditation.

Strategic Questions for *Using analytics to support critical institutional outcomes*:

- Has the institution taken the ECAR Analytics Maturity Index[22] to measure its analytics maturity and identify strengths and gaps?
- How is the institution applying analytics today?
- Does the institution have a culture of data-driven decision making? If not, how can leadership help create this culture?
- Is the institution viewing analytics as a strategic investment or as a new cost?
- What strategic questions identified in the institutional strategic plan or accreditation report would benefit from analytics?
- Has the institution performed a resource inventory to identify the campus skills and resources that could support analytics? What key skills or resources are missing that would be

essential to success? Which executive is responsible for analytics services?

■ Do current data flows, definitions, and architectures need to be restructured and redefined to support institution-wide analytics? Do data owners guard their data or share it?

■ Does the institution have strategic priorities for analytics to ensure that analytics initiatives have a clear and constrained focus? What constitutes success of an analytics initiative? How will the institution evaluate success in two years, four years, and beyond?

Conclusion

Of the 2013 top-ten IT issues, half were on last year's list, and half are new. Two issues that appeared on previous years' lists but that were notably absent last year reappeared this year: e-learning and information security. Both topics were embedded within many of the 2012 issues, but

in 2013, they are prominent and distinct enough to warrant more dedicated focus.

As is befitting of our entry into the connected age, the top-ten IT issues are not independent of one another. Two areas of overlap are particularly noteworthy. In the first overlap area, Issue #1, *Leveraging the wireless and device explosion on campus*, is a particularly challenging aspect of Issue #8, *Supporting the trends toward IT consumerization and bring-your-own device.* The EDUCAUSE IT Issues Panel felt that the challenge of burgeoning numbers of devices, although part of IT consumerization, was significant enough to call out as a separate issue—indeed, they felt it was the most pressing issue for 2013. In the second overlap area, Issue #10, *Using analytics to support critical institutional outcomes,* is about the overarching move toward analytics, whereas Issue #2 describes what the panel viewed as the most urgent application of analytics: *Improving student outcomes through an approach*

that leverages technology. In both cases, a broad strategic area is spawning a clear and specific primary challenge. In both cases, the primary challenge was ranked as more important.

The top-ten IT issues reflect the interconnections among external forces, institutional strategic priorities, and the transformation of higher education information technology. Cloud computing and sourcing (Issue #3), business transformation (Issue #9), and analytics (Issue #10) clearly illustrate how external capabilities (cloud, analytics, business practice) are influencing institutional priorities (contain costs and achieve demonstrable improvements) while also reshaping and revitalizing higher education information technology with new service options, roles, and capabilities. In other cases, the most direct connections are between external forces and higher education information technology, as is the case with balancing

infrastructure openness and security (Issue #5) and IT consumerization (Issue #8). A key feature of the connected age is the dynamic ability to aggregate, disaggregate, and reaggregate resources, services, applications, and even components of research and education. This mutability permeates the top-ten IT issues, whether with cloud computing, IT consumerization, analytics, online learning, or business transformation.

The 2013 top-ten IT issues give us our first glimpses of the connected age. As we move through this upheaval to new applications of technology and new models of higher education, it will be the collaborations within the higher education community that will help us innovate gracefully and successfully. Whether through working groups, conferences, convenings, pilot projects, research, or service consortia, we can leverage our open and collaborative culture to shape and share frameworks, lessons, data, and services to strengthen and benefit from the interconnectedness among people, data, processes, and systems. ∎

Notes

1. Eva Bogaty and John C. Nelson, "Moody's: 2013 Outlook for Entire US Higher Education Sector Changed to Negative," Moody's Global Credit Research, January 16, 2013, http://www.moodys.com/research/Moodys-2013-outlook-for-entire-US-Higher-Education-sector-changed--PR_263866.
2. Molly Broad, presentation to the University of Wisconsin System Board of Regents, February 8, 2013, quoted in Paul Fain, "Change from Within," *Inside Higher Ed,* March 4, 2013, http://www.insidehighered.com/news/2013/03/04/ace-doubles-down-prior-learning-assessment.
3. For research-intensive institutions, developing and maintaining state-of-the-art research technology infrastructure and services is also a strategic priority.
4. Diana G. Oblinger, "Higher Education in the Connected Age," *EDUCAUSE Review,* vol. 28, no. 2 (March/April 2013), http://www.educause.edu/ero/article/higher-education-connected-age.
5. Aruba Networks, "Ohio University Chooses Aruba Networks to Tackle Wi-Fi Density and Application Performance for Bring-Your-Own-Technology (BYOT)," *Seeking Alpha,* November 5, 2012, http://seekingalpha.com/news-article/4662371-ohio-university-chooses-aruba-networks-to-tackle-wi-fi-density-and-application-performance-for-bring-your-own-technology-byot; Cedarville statistic provided by David L. Rothman, Chief Information Officer, Cedarville University.
6. Eden Dahlstrom and Stephen diFilipo, with foreword by Mark Askren, *The Consumerization of Technology and the Bring-Your-Own-Everything (BYOE) Era of Higher Education,* ECAR Research Report (Louisville, Colo.: EDUCAUSE Center for Applied Research, March 2013), infographic, http://www.educause.edu/library/resources/byod-and-consumerization-it-higher-education-research-2013.
7. "Estimated Subscriber Connections" and "Total Wireless Data Traffic," CTIA Semi-Annual Wireless Industry Survey, 2012, http://files.ctia.org/pdf/CTIA_Survey_MY_2012_Graphics_final.pdf.
8. "Gartner Identifies the Top 10 Strategic Technologies for 2011," October 19, 2010, http://www.gartner.com/newsroom/id/1454221; "Gartner Identifies the Top 10 Strategic Technologies for 2012," October 18, 2011, http://www.gartner.com/newsroom/id/1826214.
9. Richard N. Katz, Philip J. Goldstein, and Ronald Yanosky, "Demystifying Cloud Computing for Higher Education," *ECAR Research Bulletin,* vol. 2009, issue 19, September 22, 2009, http://net.educause.edu/ir/library/pdf/ERB0919.pdf.
10. Quoted in Richard N. Katz, "Looking at Clouds from All Sides Now," *EDUCAUSE Review,* vol. 45, no. 3 (May/June 2010), http://net.educause.edu/ir/library/pdf/ERM1031.pdf.
11. "What Campus Leaders Need To Know About Cloud Computing," an EDUCAUSE Executive Briefing (2011), http://net.educause.edu/ir/library/pdf/PUB4003.pdf.
12. Peter Mell and Timothy Grance, "The NIST Definition of Cloud Computing," Special Publication 800-145, National Institute of Standards and Technology (NIST), U.S. Department of Commerce, September 2011, http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf.
13. Katz, "Looking at the Clouds from All Sides Now."
14. "A healthy alternative is one that celebrates being an 'accomplished novice' who is proud of his or her accomplishments but realizes that he or she is still a novice with respect to most that is knowable and hence actively seeks new learning opportunities." John D. Bransford and Daniel L. Schwartz, "Rethinking Transfer: A Simple Proposal with Multiple Implications," *Review of Research in Education,* vol. 24, no. 1 (January 1999), pp. 61–100.
15. Higher Education Information Security Council (HEISC), *Information Security Guide: Effective Practices and Solutions for Higher Education,* https://wiki.internet2.edu/confluence/display/itsg2/Home.
16. "Higher Education," White House website: http://www.whitehouse.gov/issues/education/higher-education.
17. Kenneth Thomas, "America Shows No Increase in College Graduation Rates over the Last 30 Years," *Middle Class Political Economist,* April 2, 2012, http://middleclasspoliticaleconomist.blogspot.com/2012/04/america-shows-no-increase-in-college.html.
18. Jacqueline Bichsel, *Analytics in Higher Education: Benefits, Barriers, Progress, and Recommendations,* ECAR Research Report (Louisville, Colo.: EDUCAUSE Center for Applied Research, August 2012), p. 6, http://net.educause.edu/ir/library/pdf/ERS1207/ers1207.pdf.
19. Ibid., p. 10.
20. Ibid., p. 13.
21. EDUCAUSE Analytics Sprint, July 24–26, 2012, http://www.educause.edu/events/educause-analytics-sprint.
22. "ECAR Analytics Maturity Index for Higher Education," http://www.educause.edu/ecar/research-publications/ecar-analytics-maturity-index-higher-education.

Susan Grajek (sgrajek@educause.edu) is EDUCAUSE Vice President for Data, Research, and Analytics.