Unbundling and Rebundling

Higher Education in an Age of Inequality

Laura Czerniewicz
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FEATURES

10 Unbundling and Re bundling Higher Education in an Age of Inequality
Laura Czerniewicz

Unbundling and rebundling are happening in different parts of college and university education, through new forms of teaching and learning provision and in different parts of the degree path, in every dimension and aspect—creating a complicated environment in an educational sector that is already in a state of disequilibrium.

26 Complexity: A Leader’s Framework for Understanding and Managing Change in Higher Education
George Siemens, Shane Dawson, and Kristen Eshleman

Complex adaptive systems offer higher education leaders a framework for understanding dramatic systemic change as well as approaches to engaging, managing, and driving change.

44 2018 EDUCAUSE Awards
Richard N. Katz, Celeste M. Schwartz, James Phelps, Damian Doyle

The EDUCAUSE Awards Program, under the guidance of the EDUCAUSE Recognition Committee, brings peer endorsement and distinction to professional accomplishments in higher education information technology.

74 EDUCAUSE Research Snapshot: Student Study 2018

Previewing the 2018 findings of the EDUCAUSE Technology Research in the Academic Community (ETRAC) series.

76 Strategic IT: What Got Us Here Won’t Get Us There
John O’Brien

To fully realize the value of information technology as the strategic asset it is, we must embrace strategic IT. What got us here, a remarkable utility mindset, will no longer suffice. Instead, higher education leaders must consider the role and placement of information technology in the strategic fabric of their institutions.
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Celebrating Our Community

I grew up in the Midwest, where raising your voice is generally avoided and where the word *interesting* can amount to a withering critique (as in, “That outfit is *interesting*”). While I practiced the unspoken rules of the Midwest, in my small town there was one family I secretly admired. Their sprawling, chaotic house was always lively, filled with people who held strong opinions, who talked loudly, and who used lots of reckless shoulder-level gesturing.

Early on I learned the value of both quiet and animated conversation. So the fact that you can find both at the EDUCAUSE Annual Conference is one reason I eagerly look forward to coming together every year. Conference attendees can design their own conference experience, focusing on curated sessions, on one-on-one networking, or on quiet conversations—or on scrappier conversations in the more boisterous exhibit hall. The annual conference reflects the great variety of ideas and people in our thriving community.

A powerful sense of community is evident everywhere at this conference and especially at the heart of the conference space, where “community hubs” create unique spaces for gathering. “Meet and Mingle” opportunities are designed for connecting with EDUCAUSE staff and with peers. Conference attendees can enjoy beverages and can use the “Work and Chat” spaces to host a pop-up business meeting, join a conference call, or catch up on email. Since conference days can be long, the “Relax and Renew” spaces allow attendees to take a break and recharge with the help of relaxing virtual reality, aromatherapy, and massage options.

For those who love to hear general session speakers (e.g., Michele Norris and Alexis Ohanian) and featured session speakers, there are more opportunities than ever this year. On the second day of the conference, we’ve replaced a single general session with a handful of great speakers such as Teddy Benson and Marina Gorbis.

This year we are also excited to introduce Braindates. Accessed through the EDUCAUSE mobile app, Braindates are structured opportunities for conference participants to connect with one or a few peers on topics of mutual interest. These social activities offer a new way to further extend our community through meaningful peer-to-peer connections and learning opportunities.
In 2017 Indiana State University created a 30 seat multi-purpose classroom for their Department of Earth and Environmental Systems on their Terre Haute, Indiana main campus. The primary goal of the Science Building classroom renovation was to offer a high-tech GIS & Remote Sensing lab. Our patented Hide-Away table design was utilized for this project to allow them to go from a high-usage computer classroom to a low-tech workshop space in a matter of minutes. Since the Geographic Information Systems program uses large physical maps during class time, we maximized the width of the table to 50”W while maintaining proper aisle space within the room. This larger table top provides plenty of reference room for the maps and the student’s personal books and laptops.
Of course, this mix of ways to engage with others in the community doesn’t start or end with the annual conference or any other single EDUCAUSE event. To help connect members to EDUCAUSE resources throughout the year, we’ve created the EDUCAUSE Ambassador Program. Ambassadors get access to curated EDUCAUSE content to help them (and their organizations) address the challenges they face. Sharing these resources with colleagues allows Ambassadors to increase their interaction with peers across departments and improve their visibility at their institutions while building connections and collaborating with Ambassadors at other institutions. We also offer Ambassadors the opportunity to participate in periodic calls with the EDUCAUSE programs and services teams to get their questions answered and help shape the future of association offerings.

This Ambassador Program is intended to build community connections. In addition, it is a remarkable example of how our community innovates. When I began service as EDUCAUSE president in 2015, one of the most consistent messages I heard was that younger IT professionals wanted to be more active in EDUCAUSE but didn’t know how to do so. I created the Young Professionals Advisory Committee (YPAC) not just to give these valuable members of our community a venue to get a closer look at EDUCAUSE but also, and more importantly, to give EDUCAUSE a venue to listen to their insights and make our association better for having listened. At YPAC meetings, leaders from EDUCAUSE program areas share what they are doing and brainstorm about what could be done differently and better. From one of these conversations, the Ambassador Program was born. As YPAC Chair Tina Pappas, assistant director at Rutgers University, says, “The Young Professionals Advisory Committee includes folks from a very broad cross-section of technology fields, but the one thing we have in common is a willingness to ask questions and think creatively—and the Ambassador Program is just one example of that.”

Giving voice to the depth and breadth of our remarkable community is crucial. Michele Norin, Rutgers CIO and vice chair of the EDUCAUSE board of directors, acknowledges the value of this kind of deliberate community engagement: “EDUCAUSE will continue to serve our community well if it is intentional about listening—and especially listening to the voices that have been quiet and haven’t always been heard.” Along with listening to young professionals, EDUCAUSE staff is continuing intentional work to promote diversity, equity, and inclusion (DEI) across our community. At the annual conference this year, members will have many opportunities to explore this important topic and can also sign on to the new “EDUCAUSE CIO Commitment Statement,” originally conceived by Texas Woman’s University CIO Raechelle Clemmons, a member of the EDUCAUSE DEI Task Force.

The exemplary IT professionals working in higher education could very likely bring home bigger paychecks working in industries outside higher education. Why do they stay? Often it is because there is simply no better place to work, learn, and thrive than in higher education. The strength of the EDUCAUSE community is not that we have so much in common but, rather, that we bring together and celebrate so many different ideas and perspectives.

Note
1. For example, see Howard Mohr’s video “How To Talk Minnesotan: The Power of Negative” (1993), based on his book of the same name.

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What Presidents Want from Their CIOs, and What CIOs Would Like from Their Presidents

As the starting point for this column, the two of us independently articulated the attributes and contributions we seek from the other in our critical partnership. We were struck by the significant synergy and overlap in our lists, so to create this piece we juxtaposed our wish-list items to capture this remarkable agreement while not losing our unique perspectives on what presidents and CIOs need from one another to further the goals of their institutions.

On Transformational Change

CIO: We need presidential leadership in transforming the ways we work in teaching, learning, and research contexts and in administrative departments serving the institution. Technical systems cannot transform learning or administration. CIOs need to be able to frame enterprise and academic technology projects in partnership with the stakeholders whose work is most interconnected with the data and systems in question, and with shared expectations that contemporary work requires us to learn new systems and update practices. Presidents can model comfort with change and offer influential support in emphasizing the benefits of absorbing a bit of uncomfortable change or inconvenience for the sake of broad benefits, and/or reduced risks, for the institution as a whole.

President: Transformation is key to our long-term success, but it is hard, and process is critical. Campus communities do not like change. Community members may approach technology issues in ways that seem illogical to CIOs. A CIO needs to understand institutional culture, involve all stakeholders in change decisions even if doing so is painful, and respect the needs of our many audiences. Most importantly, a CIO needs to communicate, communicate, communicate! The CIO can’t say early enough or often enough that a change is coming and why it is necessary.

On Risk

President: Presidents don’t like surprises, and bad news doesn’t get better when you wait. If there is an information breach, an outage of a critical service, or a failing system, we prefer to know immediately. We can be good partners in moving our communities to where we need to be, and we will have ideas about the critical use of available support and resources. Depending on the situation, we may have reporting obligations to the board of our institution. And if the situation makes a bad turn, ultimately we are responsible.

CIO: Presidents need to support information security and other forms of system maintenance and protection as an institution-wide responsibility to ensure that all constituents with campus credentials, system access, and/or data access are doing their parts to mitigate risk. Presidents need to be willing to use the bully pulpit to affirm the importance of safeguarding institutional resources and reputation and/or maintaining or upgrading systems, even if this causes a bit of nuisance for community members, and to prioritize investments that help reduce risk and meet current standards for information stewardship.

On Supporting Technology Choices and Investments

President: Presidents are grateful for what CIOs do, and we want to understand this work fully so as to be good thinking partners and strategic allies. Yet sometimes we don’t have the underlying knowledge, the vocabulary, or the nuanced understanding of a technology issue or practice. The CIO needs to make sure that what we need to know is accessible to us. This may try a CIO’s patience at times, but in the long run it will make us better partners and will help ensure that technology needs get the same attention as areas that may be more familiar to us. Offer a framework or a set of principles to explain the rationale for a recommendation, since we may not always have that context.

CIO: Presidents should offer clear support for the use of institutionally available enterprise services, rather than adoption of redundant or overlapping local systems. Presidents must show how the institution benefits when community members adopt common tools and platforms that meet the vast majority of needs across departments, including increased technical support, reduced costs with savings to be reinvested in more impactful ways, and less complex data integrations to build and maintain.

President: Technology is supposed to create greater functionality and efficiency in our institutions, and yet so often new technology seems to require greater expenditures and more staffing (or the same staffing even as more work is automated). While it may be the case that efficiency is always a driving factor, efficiency often seems to get short shrift in proposals that foreground performance benefits or sophisticated technology. That said, presidents tend to focus more on increased costs and less on victories around savings—so CIOs should...
be sure presidents notice and celebrate when investment has indeed led to savings and efficiencies.

CIOs also need to be strategic in presenting investments in new technology and projects. Presidents often feel like they are being presented with an endless list of infrastructure improvements, systems upgrades, and needs for new products. The CIO should identify true priorities and a long-range, phased plan for how to achieve them—and that plan should be in sync with the institution’s budget. An ongoing list of projects with little understanding of cost or feasibility is easy to dismiss.

On CIOs as Partners in Strategic Planning

CIO: Presidents should position CIOs at the table where institutional context and priorities are discussed, so that data and technology planning is aligned closely with the aspirations and high-impact goals of the institution. Understanding what drives the institution is essential to shaping IT operations and prioritizing investments. When positioned as partners with other senior leaders, CIOs and their teams can help raise awareness of new possibilities that emerging technologies or new forms of access to data might open up.

CIOs hope that their presidents will convey the idea that “data-informed” is a better model than “data-driven,” ensuring that constituents on campus understand that institutional decisions are mission-driven and wisdom-driven, with data playing a supporting role in answering important institutional questions. Data is only as powerful as the questions we ask of it and the analysis we bring to it. Both quantitative data and qualitative data are important resources to collect in addressing complex institutional questions. CIOs and the data professionals on their teams can provide significant support to the institution by ensuring that platforms, tools, and expertise are in place to enable effective data collection, integration, reporting, and analysis.

President: The CIO should fully participate in the strategic planning and visioning of the institution. That can’t happen if CIOs don’t have a good understanding of the complexity of the institution and its mission—from academic programs to faculty research to the needs of students to the functionality of campus spaces. CIOs need to meet with fellow vice presidents and invest in understanding their work and must not allow themselves and their teams to be marginalized as a service department. The unique knowledge and institutional perspective of a CIO is invaluable to a strong vision, but CIOs can contribute only if they are—and are seen as—leaders who are fully versed in the whole institution.

On the Role of IT Professionals

CIO: Presidents need to support “out of the box” contributions from IT colleagues and participation in the overall educational enterprise. Presidents can benefit from encouraging IT staff to engage across the institution as a whole: serving on campus-wide committees; attending campus events; teaching courses in subjects where they have expertise; facilitating other forms of learning for students; or teaming up with faculty, students, and staff to create an inclusive environment in which everyone thrives.

Presidents can derive benefit from recognizing that information technology as an industry has developed standards and practices that may be useful models for the broader institution. These include project prioritization and management, service planning and delivery, and budget planning and tracking. The IT organization may also have strengths in change management and agile methods for accomplishing goals and in leadership and collaboration skills developed to stay on top of the fast-evolving cycle of technology change. IT organizations have had to focus on user design, client experience, customer support, consultation skills, and participatory design for new programs or services. And IT professionals tend to be lifelong learners and avid problem solvers. A president who recognizes the frameworks and practices that the IT organization cultivates through its work, and who encourages adoption or sharing across departments, will benefit by taking this systems thinking to the institution as a whole.

President: CIOs are critical to institutional success:

- CIOs provide mission-critical tools and institutional capacity on a daily basis so that presidents can do our jobs well, supporting our work across an incredible range of technology needs.
- CIOs bring unique knowledge and backgrounds that can advance the institution. Many IT staff have diverse work experiences that are invaluable to creative decision-making and flexible problem-solving. IT staff can also inspire colleagues to build strong technical skill sets.
- CIOs play a critical role in educating our students, from direct participation in courses, to supervision of projects in digital scholarship, to education programs in information security and software use, to mentoring students in campus jobs that help students build technical and professional skills.

Presidents can’t thank and encourage our CIOs often enough.

We enjoyed making explicit the underlying assumptions we have about what makes this institutional partnership effective. We hope our reflections spark many similar dialogues, and we welcome comments about what works from other institutional vantage points.

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Unbundling and rebundling are terms that have become more widespread in the last few years, in articles in the Chronicle of Higher Education, Forbes, Huffington Post, and EDUCAUSE Review. But these terms do not come from higher education; their original source is the banking industry. An online search for unbundling and rebundling today will lead to results not only in banking but also in the computer industry, legal services, and of course, the music industry. Relatively recently, these concepts have become realities in higher education—at a time when state funding for education is decreasing, higher education tuitions are increasing in many parts of the world, and student numbers and demographics are changing as well.
Very simply, I’m using the term *unbundling* to mean the process of dis-aggregating educational provision into its component parts, very often with external actors. And I’m using the term *rebundling* to mean the re-aggregation of those parts into new components and models. Both are happening in different parts of college and university education, and in different parts of the degree path, in every dimension and aspect—creating an extraordinarily complicated environment in an educational sector that is already in a state of disequilibrium.

Unbundling doesn’t simply happen. Aspects of the higher education experience disaggregate and fragment, and then they get re-created—rebundled—in different forms. And it’s the re-creating that is especially of interest. What does this all look like? Let’s start with what’s happening in the area of disciplinary knowledge: curriculum; flexible pathways; resources; and academic expertise.

### Disciplinary Knowledge

**Curriculum**

Curriculum is at the heart of what we do in teaching and learning in higher education. Traditional, residential higher education institutions offer formal, credit-bearing curricula with lectures, tutorials, and seminars. They also offer semi-formal forms of delivery such as short courses as well as non-formal offerings such as summer school or public lectures. Recently there has been expansion into that non-formal space, especially with massive open online courses (MOOCs). Five years ago, MOOCs were completely in the non-formal space, but this has changed. What’s particularly interesting now is the intersection between non-formal, semi-formal, and formal. This interface at the blurring of boundaries is where innovative forms of access and new models of provision are emerging.

What is also happening in the online sphere is that the different dimensions of teaching courses and programs are separating out or disaggregating. These dimensions comprise various granular components: e-readiness; program-level planning; course design and development; course delivery; course student support; course and program evaluation; and course maintenance/updates. Every single component within those dimensions can be offered by a different provider or vendor as a single service or as multi-services. This has serious implications for platforms, for practices, and for assumptions about students’ abilities. This separation of the different dimensions is adding to the complicated nature of the student experience and to the assumptions we make about the students who will have to cope in an increasingly blended and online system. Students will need complex digital literacies to negotiate these new forms of curriculum provision.

The curriculum landscape is deeply entrenched and is very slow to change. The critical shift from informal to formal involves boundary-crossing and fuzziness. We have to ask ourselves: Whose interests will these new forms of curriculum provision serve? Which kinds of students are going to benefit? In which places? For what types of institutions? And at the same time that *how* the curriculum is provided is changing, there is a great deal of work still going on to change the nature—the *what*, the content—of the curriculum. These issues include transformation and decolonization, surfacing the student voice as well as humanizing the curriculum experience.

### Resources

Teaching and learning resources are also being unbundled. They’re becoming more granular, multifaceted, and multimodal. They’re becoming more complex. They’re becoming more modular. Resources fall across axes of different kinds of intellectual property regimes and governance structures: digital versus analog; full copyright versus open licensing. Depending on those intellectual frameworks, how the unbundling and the rebundling happens will be different.

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**Components of a College/University Education**

- Curriculum
- Flexible Pathways
- Resources
- Academic Expertise
- Support
- Credentials
- Networks
- Mode
- Place
- Graduation
- Competencies and Metaskills

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We’re seeing different experiments and models for resource provision, including the subscription model: access while you pay. Proprietary textbook options now include—an “all-in-one” digital subscription. Users pay a license and can get everything (whatever that means) for as long as they pay. When they stop paying, access stops, unlike with traditional models of ownership. So Netflix comes to higher education, and students no longer own their own textbooks. This kind of rebundling offers more for the duration but works only for those who can keep paying.

There are also original resource innovations using commons models based on open licenses, enabling ongoing free use for all, often with adaptation rights too. A popular approach in this space is the freemium model—that is, something that is partially free and partially open and partially paid for. This model is usually promoted as something of great value and of great good, but we should ask: Is it? And when is it advantageous? To whose advantage is a freemium model? Who can afford to pay? Is it unfair to offer something that is only partially free—fully available only to those who can pay?

Auditing and free MOOCs are on their way out. When a participant joins a MOOC today, it’s really quite an effort to participate in the free version (when a free version is still available). There are so many moments to pay that the participant needs to be aware that it’s actually possible to audit the MOOC and participate for free. Is the promise of free access dead in the MOOC sphere? What are the implications of the shift to a licensing model? This signal from an “open” approach to one similar to the entertainment or music model of access—with access available only while a user pays—raises equity concerns for those who argue for MOOCS as democratic, public-interest models of innovations in provision.

This raises an interesting dilemma in the MOOC sphere. Some providers offer full financial aid. So there’s no auditing, and participants can do everything as well as get a certificate. That’s a good thing, isn’t it? But what about the politics of having to ask for access, of having to declare poverty? This uncovers the complexities of charity; is receiving financial aid a preferable solution for those who are trying to gain access and be sure of full participation?

Flexible Pathways
One of the important promises of an unbundled higher education environment is that of flexible pathways. Ease of access—ease of movement, portability, mobility—is much touted. This can be seen in the formal sphere, for example in initiatives where students can exchange courses and move within the sector: “California Community Colleges, the nation’s largest system with 113 institutions,” launched a course exchange “so students at one campus can take classes online at another if those courses aren’t available on their home turf.” California began its Online Education Initiative in late 2013, including “building an online course exchange and creating additional services like counseling to support students in online classes.” Flexible pathways enacted.

Further flexibility is exemplified by MOOCs and microcredentials (such as nanodegrees), which MOOC providers are developing: these enable students to collect credits that will take them from the non-formal into formal spheres. Their credits can be counted so that they don’t have to pay as much and don’t have to take all of the courses in the formal sector. This is a real opportunity and a significant shift away from the way things have always been done, especially for expensive postgraduate programs.

Until you look at the numbers. In one example, 323 people out of 34,086 were able to take advantage of MOOC credits. Is that really a form of access? On the one hand it is, because 323 people gained access—people who wouldn’t have gained access to a program that might otherwise have had 20 students. On the other hand, this is an incredibly small fraction: 1 percent. How widespread will this become? It is not clear yet, which is why this is such an exciting and emergent space.

All of this raises questions not just about access but about success. Access is only entrance—allowing someone...
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to join the party, to get into the system. What about succeeding in the system? How are students going to succeed in the college/university of the future with hybrid online/non-online courses centered around students with credits accruing from multiple schools, in alternating periods of attendance and absence? How are students going to have coherent educational experiences? What kinds of cultural capital do they need to negotiate such an experience? These are the harder questions to answer.

Academic Expertise
Both the academic expert and academic expertise are becoming unbundled as well, giving rise to new roles, including the rise of the para-academic. This is happening at the same time that academia itself is going part-time and becoming less secure. We’re seeing the growth of the academic precariat, with all the worrying implications that has not only for a decent and humane working life for academics but also for robust knowledge production and dissemination and for the coherence of the student experience.

Finally, does the automation of the professions apply to academia? I think it does. Roles and activities are already being transformed—humans can be replaced by chatbots offering robotic tutoring, and the holy grail of automated marking is being pursued as digitally mediated rebundled teaching is reimagined. My question here is: In an age of adaptive learning, how will an increasingly fragmented, dispersed, and precarious academic body share knowledge with and enable a coherent, caring, and supportive learning experience to all students?

Opportunities
A college/university education affords the opportunities of support, credentials, and networks.

Support
Learning support is expensive. The challenge is to remove that cost without impacting access and quality. The new environment, unbundling, and adaptive learning promise to remove that cost. And we’ve seen this promise: “The term [MOOC] applies to any course offered free, online and at scale. What marks the MOOC out from conventional online..."
learning is that no professional academic time (or virtually none) is allocated to guiding or supporting individual learners. But is access without support opportunity? Vincent Tinto argues not: “Effective student support does not arise by chance. It requires intentional, structured, and proactive action that is systematic in nature and coordinated in application.” Paying attention to support is essential to an equity perspective on education. The legislation in South Africa, for one, makes this absolutely clear. The goal is to “promote equity of access and fair chances of success to all who are seeking to realise their potential through higher education.”

Just to provide one example from South Africa, of students in contact (face-to-face) mode, 63.6 percent had graduated after ten years of study. Of students in distance mode, only 14.8 percent had graduated after ten years. While not all distance education is online, there is much to be learned from decades of distance education experience. Moving into the online sphere has profound implications for those who are committed to successful education for all. Online is neither easy nor trivial. But of course support is also a market opportunity. The number-one area of investment in educational technology is in learning support.

In addition, support is being automated. Learning analytics and adaptive learning promise to automate support and to replace “pastoral care.” But the dangers of automated support can be severe. The risk is a differentiated system in which the poor will have the support of machines and algorithms while the rich will have face-to-face and paid support. Is there an alternative? How can the affordances of new technologies be exploited and leveraged to ensure appropriate, affordable, and caring support for all?

**Credentials**

Credentials and new forms of credentialing are central to how unbundling and rebundling are being enacted. As Sean Gallagher notes: “The traditional boundaries are blurring between professional development, occupational credentialing and formal higher education.” We are seeing the intensification of new forms of agreement around competence and status, including not only credentials but also micro-credentials, “nano”-degrees, and badges (digital badges, open badges). This may even lead to omitting the college/university altogether as educators and organizations collaborate and use their own forms of credentials. The battle for new forms of legitimacy is central, and the jury is still out.

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[45% of students chose to not register for a course due to cost.](https://press.vitalsource.com/vitalsource-survey-due-to-high-cost-of-college-students-skip-purchasing-course-materials-grades-suffer-as-a-result)

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Credible commentators in higher education do not agree. Sociology Professor Tressie McMillan Cottom states: “There is little evidence that the labor market values most of these new credentials.” On the other hand, Michael Feldstein argues that digital badges, at least, are gaining traction: “They seem to be filling in cracks that more formal credentials don’t cover.”

Certification is an equity issue. For most people, getting verifiable accreditation and certification right is at the heart of why they are invested in higher education. Credentials may prove to be the real equalizers in the world of work, but they do raise critical questions about the function and the reputation of the higher education institution. They also raise questions about value, stigma, and legitimacy: A key question is, how can new forms of credentials increase access both to formal education and to working opportunities?

Networks
Finally, a third opportunity involves social networks and social capital. Residential colleges and universities are sites of peer interaction and the development of social networks and social capital. What will the potential differentiation of the system mean for how social capital is imbued and gained? Will the elite residential institutions be the ones to inculcate and enable the networks of social capital? How will students who are outside that system gain social capital? Can valuable networks be built in rebundled digitized environments? Or will “bricks for the rich and clicks for the poor” mean that they will be effectively locked out?

Graduateness
Graduate Competencies and Metaskills
What does it mean to be a graduate in this environment in which “graduateness” is a brand? For many employers, what students have studied is not the issue; many employers are more concerned with where students have studied. The brand of the institution signals a particular kind of graduate. Attributes and literacies are assumed as a result of co-curricular experiences. Students and parents know this. So what does an increasingly object-oriented, competency-based unbundled higher education mean for the notion of graduateness?

Experience
Mode
Online is now close to mainstream. In the United States, more than 30 percent of higher education students are enrolled in at least one online course. In our research, one senior academic stated: “I think online is the future of universities. Because of the financial strain, because of the fact that we live in a global community. Perish the thought but I think that is going to happen.” Willingly or unwillingly, we’re headed that way.

The online mode is also creating new functions and capabilities. Online courses require different and often expensive types of work including professional development, technologies, design course/program specifications, instructional design, learning materials, student identity verification, assessments, accessibility, and accreditation. And online is producing not only new market opportunities and new enabler companies but also new relationships: with private companies as partners or service providers and through both outsourcing and insourcing.

The online mode is creating a differentiated system, with diversified offerings for different groups. For example, the University of Pennsylvania’s Wharton School offers an MBA degree, in various formats. In an analysis of 875,000 students in 9 MOOCs, a higher percentage of foreign-born students, of unemployed students, and of underrepresented minorities enroll through the MOOCs. Depending on your view, that is either an increase in access or an increase in marginalization, representing a differentiated system that is keeping those students out of the mainstream experience. Which is it? The answer is not straightforward.

Equity considerations abound. One large-scale U.S. survey of 40,000 students in nearly 500,000 online courses found that all students suffered in performance in online courses. However, some struggled more than others: males, younger students, black students, and students with lower grade point averages. Other research found that online courses were
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not working well at community colleges, where 11 percent of the students were less likely to pass an online version of the same course. Retention too can be worse in online courses. So, it seems that online courses as they are currently designed don’t always deliver on their promise of expanding access to higher education.

Indeed, online courses are not always favored by those for whom those good intentions are offered. A British Council study of Syrian refugees found that they believed that the people who taught those online courses were not as good as face-to-face teachers. And they were, once again, concerned with the matter of accreditation. The online space is clearly rife with complex and profound issues raised by equity and by increasingly pervasive private/public partnerships: new and changing roles and responsibilities; ownership of the academic project; academic identity and responsibility; the impact of commercial values on teaching and learning; as well as emergent values needing close interrogation.

Place
Place is being replaced by platform, by new learning environments. What does this mean for the student experience? What kind of identity and community is possible in cyberspace? What is a sense of place in the online sphere?

Online shifts the focus and the potential beyond the local. Providers are competing for the growing global middle class. The middle class is anticipated to comprise two-thirds of the world’s population by 2025, with emerging economies expected to increase their share of the global medium-high, middle-class, and affluent segments from 24 percent in 2000 to 67 percent by 2025 (or by 2 billion people). The African middle class tripled from 2000 through 2014. Technology and market liberalization thus open up opportunities to pursue the broader conceptual opportunity of the “borderless” student population. With the intense competition for capable moneyed students from everywhere in the world, and with the options for these students to apply to any provider anywhere, where does that leave those without financial resources? Who is responsible for everyone else? Is the local college or university left to provide education for the have-nots while the have-gos online to more prestigious educational providers from other countries? Or will rebundling see the elite remain residential while the rest go online locally?

Unbundling and Rebundling: Opportunity or Threat?

The first problem when debating whether unbundling and rebundling are opportunities or threats is that the associated words themselves have different meanings depending on the agenda being promoted. For example, flexibility can mean convenient and mobile, but it can also mean incoherent, fragmented, and difficult for those without cultural capital. Sharing can mean generosity, openness, and opportunity, but the sharing economy is known to be exploitative. It’s a gig economy. How could that sharing economy be appropriate in higher education? There are indications that this is already a danger of a disjointed unbundled higher education learning experience. Indeed, the notion of a value proposition is contested. Are we talking about a return on investment, or are we talking about the creation of social citizenship? These terms are all semantic bleaching.

The unbundling/rebundling debate speaks to the battle for the soul of the college/university. Are higher education institutions going to become businesses specializing in preparing people to work in businesses? Or are they going to be places that create citizens with humane perspectives and critical stances serving the public interest? This is the tension that is being manifest in the trends noted above.

The unbundling/rebundling debate also speaks to the relationship between the market, the state, and the commons. It is essential to consider rebundling in the light of the possibilities of the commons. At the moment, arguably, the
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The market-led approaches have recognized the opportunities that unbundling and rebundling provide and have found ways to monetize every single aspect listed so far, including graduate capabilities, support, credentials, networks, disciplinary knowledge, opportunities, experience, graduateness, mode, place, curriculum, learning pathways, resources, and academic expertise.

This raises some critical questions. Who’s doing this monetizing? Why? For what purpose? Which types of knowledge are being valued? What is considered “valuable” in higher education? What is the meaning of the academic “brand”? Who is regulating and shaping those markets? And why is this all so urgent now?

Still, can higher education be a “real” market? Here, Simon Marginson’s work is helpful. He argues that it would be very difficult for higher education to become a real market in the same way as banking, for example. Why? First, because knowledge is a public good despite all attempts to make it a private good. It is non-rivalrous and non-excludable. It is not clear exactly what the product is. Second is the role of status competition: higher education is one of the few areas where the consumer brings something to the relationship. Third is the role of rankings, fixed and selective: non-elite institutions cannot entice elite customers simply by dropping the price for the same service. They don’t have the right brand.25

A final consideration is the role and responsibility of the state. There has always been a relationship between the state and the market. There’s nothing new about that relationship. What is new is the question of who has control of that role and relationship. The pendulum has swung. Who determines the priorities for market behavior? Who defines the objectives? Who makes the decisions? Who regulates and shapes? What is gained, and what is lost—and by whom?

The terms of the relationship matter. Mahmood Mamdani has written extensively about this in his book *Scholars in the Marketplace* and elsewhere. He talks about “soft versions” of the relationship, in which the public university sets the terms, and “hard versions,” in which the private sector sets the terms. And he discusses limited privatization, the critical appropriation of the market for public ends, and commercialization, the appropriation of the public for private ends.26

Higher education is a hybrid ecology. Other possibilities for shaping provision include the model of the commons. The idea of the commons places knowledge and educators as knowledge producers in charge at the center, in a shared understanding. This approach foregrounds co-creation and participation. It develops governance mechanisms premised on shared resources. And it shifts the discourse from a market-led higher education knowledge economy to an open, collaborative, learning-led knowledge society.

How can the market be regulated in unequal contexts to serve the public good? I believe the answer is through appropriating commons approaches to higher education and through reasserting the role of the state, which has been systematically underfunding the higher education sector. The state has too often abdicated its role as regulator and ensurer of higher education as a public good. It is...
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the state that needs to mediate and shape the possibilities of the market and the role of the private nature of higher education. Despite all the challenges, it is the state that has the primary responsibility to ensure that redress, successful participation, and disadvantage are addressed. If unbundling and rebundling are to serve the needs of a knowledge society for the good of all, how can the state enable the requirements of socially responsible public education for a democratic citizenship?

Conclusion

It is not inevitable that profit making will determine how unbundling and rebundling in higher education will play out. The situation is dynamic, in flux, and highly contested; it is being negotiated and renegotiated right now. Unbundling and rebundling in teaching and learning are about power and contestations. Emergent models and innovations are appropriated by competing discourses and agendas. Is it a problem or a solution? As part of the problem, unbundling and rebundling may serve the interests of the few rather than the many and may serve the private good at the expense of the public good. The risks are many, including fragmentation in higher education, leading to an incoherent student experience, and monopolization of the higher education sector by a few companies, just as has happened in other sectors.

But I'd like to conclude on a hopeful note. Unbundling and rebundling can be part of the solution and can offer opportunities for reasonable and affordable access and education for all. Unbundling and rebundling are opening spaces, relationships, and opportunities that did not exist even five years ago. These processes can be harnessed and utilized for the good. We need to critically engage with these issues to ensure that the new possibilities of provision for teaching and learning can be fully exploited for democratic ends for all.

Notes

2. See “The Unbundled University: Researching Emerging Models in an Unequal Landscape” website, a 26-month project of the ESRC (Economic & Social Research Council), the NRF (National Research Foundation), the University of Cape Town, and the University of Leeds.
5. The book Made with Creative Commons [2017] showcases a variety of resources that have been made available with Creative Commons licenses through open approaches.

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In 2011, an open online artificial intelligence course offered at Stanford University attracted several hundred thousand registrants, launching frenzied global interest in how teaching and learning could be extended by colleges and universities. In 2017, Purdue announced it was purchasing Kaplan to create a new public online university. In California, decades-long flirtation with distance education resulted in the formation of a statewide online college in early 2018. In June 2018, two large public Australian universities (University of South Australia and University of Adelaide) announced they were exploring options for a merger to create a more competitive international university. These examples highlight the radical responses that higher education institutions are now required to undertake as a result of the significant pressures from reduced research funding, increased government requirements to address labor market needs, mounting public calls for accountability, and growing questions about the utility of a traditional college/university degree.

A Leader’s Framework for Understanding and Managing Change in Higher Education

By George Siemens, Shane Dawson, and Kristen Eshleman
For higher education leaders, this environment can be overwhelming as traditional approaches for managing institutions seem woefully underpowered to meet the multitude of economic-social-technical changes. The integrative approaches and core principles of complexity science can provide a framework to address these challenges and to understand the role of rapidly changing colleges and universities in a society that has long been experiencing disruption and transformation.

**Enter Complexity Science**

Complexity is the foundation of life—evident in even the most mundane of situations. Recall a time when you’ve found yourself stalled in traffic. You probably began to wonder about ways to solve the traffic problem. If only more people took public transportation. If only the government implemented more public transport zones. Wouldn’t these actions resolve the problem? In short, no.

Traffic, like higher education, is a complex system. Imposing actions or designing for strict management of behavior does not lead to direct linear outcomes. The relationships between jobs, locality, families, housing, work and government policy, tax processes, crime, psychology, environment, access to education, and urban planning interact and converge in what is known as a Complex Adaptive System (CAS). The complexity inherent in this system relates to more than the large number of interacting agents. The actions and interactions that these agents perform are often independent and unpredictable. In the context of implementing large-scale transformations in higher education, there is much we can learn from studying a CAS. Complexity can be understood as a theory of change and adaptation that details how change occurs within systems as well as the principles and mindsets needed to flourish in turbulent environments.

Understanding such system dynamics incorporates a range of insights from biology, information science, anthropology, sociology, and psychology. More so, managing within a CAS is unpredictable and requires new ways of thinking and new ways of doing. These approaches often feel counterintuitive to the causal-seeking attributes that have evolved in the human mind. In the example above, traffic congestion cannot be solved by dismantling a car and learning about its individual functions. Further, attempts to control traffic congestion through strict management in the form of traffic lights and intersections can exacerbate the problem. Likewise, we cannot provide solutions to the challenges confronting higher education by adopting reductionist thinking. Unfortunately, reductionist thinking has great appeal to people faced with a mind-numbing scope of change. In fact, the reductionist thinking often prevalent in higher education produces numerous inequitable, unplanned, and detrimental consequences.

In contrast, the *complexification* of higher education is an intentional goal of engaging with complexity rather than attempting to reduce it to its constituent parts. Effective vision generation, planning, and goal achievement in the modern uncertain economic-social-technological environment benefits from embracing complexity and the utilization of strategies and actions that reflect a CAS. The five complexity principles detailed later offer an organizing framework for administrators, academics, and policymakers to consider as they navigate uncertain, unpredictable, and rapidly changing educational contexts.

**Defining Complexity**

The first challenge is navigating the breadth of various sources that attempt to define complexity. A quick search reveals discussions of complexity from consultants and educators in government, biology, neurology, political science, sociology, organizational theory, and philosophy. Definitions are aligned with the intended use of the author and the specific disciplinary context. Researchers recognize the definitional challenges: “Complexity is so general a term that it seems to mean something different to everyone.” General agreement, however, exists that complex systems involve “many simple parts [that] are irreducibly entwined.” These parts, or agents, interact in ways that give rise to “evolutionary processes and often surprising ‘emergent’ behaviors.”

The actions that lead to emergence occur within a conceptual framework of self-organization and adaptation at agent-level interactions. These agent-level interactions are supplemented by interactions with the environment and inclusion of feedback in subsequent evolution, a process “that further increases its knowledge and intelligence.” Central, then, in a CAS are (1) the agents, (2) the interconnectedness of multiple agents, (3) the environment, and (4) feedback influencing the ongoing evolution of the system. These basic elements interact in ways that produce outputs that are not always easy to predict. As a simple illustration, many of the intractable problems in academic environments, such as attempting to increase the success of under-represented learners, cannot be achieved through the implementation of a policy. Cause-and-effect in social
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systems are not so tightly coupled as to produce a desired outcome from a single simple action. For leaders, the transition from simple cause-and-effect to integrative thinking is the key insight that complexity science offers.

Unfortunately, researchers in complexity science have largely focused on understanding complexity as a phenomenon, rather than as an approach to fostering organizational change. With some exceptions in business environments, complexity science has not been widely promoted or adopted in higher education across the range of processes that include budgeting, planning, vision setting, implementation, and subsequent monitoring. However, the application of complexity theory in education environments is not entirely novel: a brief search of academic databases reveals several articles and texts from early 2000, linked to systems change. What is unique today is that the scope of complexity has changed rapidly due to a range of economic-social-technical trends, resulting in growing gaps between the utility of traditional higher education management approaches and the emerging network, systems, and CAS models. The world itself has become more connected and integrated over the past several decades, increasing the need for greater understanding of how systems inter-relate, integrate, and perform when dramatic new realities are introduced, such as the 2008 global financial crisis or smaller-scale events such as mergers between colleges and universities, or changes to national student loan models.

**Five Complexity Principles**

An important role of higher education is preparing individuals to engage meaningfully in society. What happens, however, when the modes of interacting with information presented in formal learning environments no longer align with the lived experiences of learners in work and other environments? The existing higher education system—with its focus on credit hours, semester-long courses, and formal credentialing—fails to account for new practices available in a digital, and globally connected, world. This is evident in today’s global online learning environments, which increasingly blur formal and informal practices.

Five principles of complexity science are of particular relevance to the higher education system. These attributes—networks, emergence, self-organization and social coordination, feedback sensitivity, and agility—are sufficient to provide higher education leaders with an entry into complexity science as a means of observing, understanding, and interacting with change.

**Complexity Principle #1: Networks**

We live in networks. Our use of media, transportation, communication, work, and banking is indicative of the range of networks that permeate all aspects of our lives. The rapid spread of the 2014 Ebola outbreak was due to our tightly connected global village. What is local is global. Nowhere is this truer than our information networks. Through social media, events can go viral in minutes. For students, access to professors via YouTube recordings or open online courses has thinned the classroom walls. Networks form the underpinning structure of society and of our education system.

In spite of this reality, it is unusual for colleges and universities to adopt networks in a substantive way. The Digital Learning Research Network (dLRN) (https://linkresearchlab.org/dlrn/) reflects the difficulty that existing systems have for distributed network structures. The inception of dLRN was a $1.6 million grant from the Bill & Melinda Gates Foundation in 2014. The focus for dLRN was to integrate research expertise with localized needs across the California, Georgia, and Arkansas higher education systems. It became apparent early in the process that colleges and universities were not structured in a manner that could easily facilitate the development of collegial networks. For example, sharing doctoral students, engaging in co-creation of resources across different systems, and planning and budgeting processes highlighted the inability of these systems to adjust for nonmainstream activity. While researchers were generally comfortable working with others, the systems for planning and financial resource allocation and overall accounting required a more linear arrangement established in isolation of other co-providers. Although the project as a whole was successful, the experience of constantly pushing against linearity to enable network performance was a substantial resource drain. Mary Uhl-Bien and her colleagues outline this tension between administrative and adaptive functions in an organization, emphasizing the need for leadership to be active in the emerging sites of conflict that inevitably arise between the organizational functions that call for stability (business as usual) and those that demand creativity and adaptation.

Networks reflect the fundamental change needed to transition from conventional thinking to thinking in systems and complexity. The structural attributes of a college or university (e.g., organizational charts and faculties) can restrict innovation by impeding the flow of information and opportunities for cross-fertilization of ideas between disciplines. Higher education institutions have started to adopt
strategies to minimize this silo effect, including “cluster hires” of academic and professional staff across faculties and the creation of new interdisciplinary research labs. These innovations, however, continue to occur in a heavily siloed system.

Understanding networks and how institutional structures can either enable (foster learning) or govern (get in the way of learning) is a critical design criterion for the future of higher education. Primarily, networks represent a shift in control over information and resources. This transition from hierarchy to networks in education surfaces staff and student expectations for greater transparency with senior leadership while placing more autonomy in the hands of learners. In the public domain, it raises the level of accountability for what happens in classrooms and how teaching practices impact future employability. Networks also move college and university activities into the mainstream, as experienced by Middlebury and Evergreen State Colleges in 2017. In networks, everything is just a short jump from everything else.

There are many advantages for a networked institution where information flow is rapid and where actors have an increased degree of autonomy. However, in the leadership space, there is a competing need for stability and security. Leaders must be comfortable with this tension and identify the sites of coalescence or emergence of such networks of power in order to enact change when necessary. Leading in a system of constant transparency requires openness and democratic engagement with all constituents in the higher education sector while still retaining the important role of making decisions on those emerging innovations that hold the greatest long-term promise.

Complexity Principle #2: Emergence
It is not surprising that developing effective leaders in education has long been an area of research interest and professional development. Traditional notions of “command and control” managerial

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leadership were established in times of stability when action and response could be seen as a linear process. Such leadership models are less effective in modern organizations where rapid innovation and adaptation are essential attributes for sustainability. Leadership models that work on a reductionist model fail to account for the inter-relationships between the different parts of a system.

The interconnected nature of these relationships can produce another system attribute called emergence. Emergence is the generation of behavior that lies one “stage above” current actors. This means that individuals create society, an entity that exhibits its distinct attributes not present in the sum of its parts. For example, millions of people on social media create social movements or draw attention to injustices or amplify what were previously localized causes. For leadership, this raises important challenges regarding changing, redirecting, and influencing emergent systems toward planned goals or targets. More recently, work in effective models of leadership has focused on understanding the system dynamics and developing the environment for where emergence of desired outputs can begin to occur at a local and ground-up level. Such a model of complexity leadership “enables the learning, creative, and adaptive capacity” that occurs within a CAS. As noted above, a complexity leadership approach seeks to balance the interplay between the administrative and the adaptive functions in an organization. When pressure is placed on an organization (e.g., financial, technical, political, or social), the enabling leadership responds by balancing the interactions that operate in these two primary organizational areas.

The administrative functions include the day-to-day operational and coordinating tasks. This area is one of stability and enables standardization and scale in the organization. It is not an area that can quickly or appropriately innovate. For the education context, such operations may include adhering to state and national policies and regulations, balancing budgets, retaining student enrolment details, and managing course schedules and timetables as well as assessment dates. A second dynamic is the adaptive functions of the organization. This is an area that is frequently tasked with developing innovative responses to complex issues. For instance, student retention is a multifaceted institution-wide challenge. A response to declining retention will not emerge from applying more administration. It can be addressed only by understanding the relationships and challenges that permeate within the schools and faculties, teachers, courses, and surrounding contexts and by understanding how an individual student interacts in these spaces. This is a complex problem requiring a more holistic and innovative response that is developed through the adaptive areas of the organization. In short, reviewed policy or enhanced technologies will not address retention without an understanding of how these resources are enacted in situ.

Change and innovation must be developed from the bottom up. Those closest to the phenomenon (e.g., as a result of new student profiles, rapid adoption of technologies, proliferation of social media for communication, students’ exploration of content and resources outside of the classroom) are better able to sense and respond in a way that supports learners rather than marginalizes them. However, when a significant number of innovations (responses to a problem) are in operation without further opportunity for scale, an organization can appear scattered and inefficient. The interplay, and balance, between administrative and adaptive roles is essential; this is where transformational or enabling leadership is essential. The role of emergence is to have ideas and concepts arise organically, driven by those who are closest to the change pressures. Organizational leadership that has created and fostered this type of culture finds itself less at odds with the zeitgeist. The intent of leadership, then, is to create organizational mechanisms that allow information to flow across an organization, particularly to decision-makers.

If the operational balance of control is weighted toward administration, an organization is unlikely to be able to quickly respond to complex pressures. Alternatively, if the balance is shifted to the adaptive functions, then the organization may lack the capacity to scale and standardize, ultimately diminishing future opportunities to innovate. In this context, an enabling leadership seeks to foster and build power networks that bring together diverse agents in a system. When actors from diverse groups in an organization come together to address an emerging concern or issue, there is often friction. Such friction, however, can result in novel ideas able to effectively respond to complex pressures. Resolving the friction is a key enabling function that can then commence shifting the response from small innovation to scale by including the administration roles of the organization. In an age of complexity, leadership must enable opportunities for creative and entrepreneurial responses by cultivating the conditions for complexity to thrive and for grassroots innovation to emerge.

Complexity Principle #3: Self-Organization and Social Coordination
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leaders are confronted with the need to enable self-organization. Self-organization involves the processes whereby individual agents begin to organize and achieve tasks or activities. Many of us have experienced or observed this dynamic on social media when an event, often a crisis, unfolds and requires individuals to act in a coordinated response. For example, following the 2014 earthquake in Haiti, over 450 volunteers from the OpenStreetMap community solved a complex challenge by collectively mapping the roads within Haiti using newly released satellite images, as a result creating “the most detailed map of Haiti in existence” and assisting rescuers’ and reconstruction efforts.13 With an open platform—or at a minimum, a platform that allows individuals to contribute—complex problems and challenges can be handled through self-organization and social organization strategies. Similar open and connected acts of creativity and self-organization underpin much of the open-source movement and many of the critical technologies we all use on a daily basis.14

Leading change in education has historically been an exercise in command and control. A look at K-12 education reform reveals efforts to reduce institutions to machines and its people to data points. No Child Left Behind (2001) and Race to the Top (2009) are engineered designs—linear, ordered, and outcomes-based. A complexity approach looks at institutions as human systems. Approaching the problem through this lens, we can see that what is needed is a way to enable the evolution of the system through the actions of its people. The practical output of seeing an organization as a human system is a collection of policies and procedures that enable ideas and information to flow, ensuring that innovative solutions are generated. In higher education, one example is the University of South Australia’s first UniJam in 2016. The online event was designed to enable all staff and students to engage in an open, transparent discussion about the future goals and vision for the university. Evolving from this two-day event was the formation of the university’s strategic action plan. In short, the process allowed the university’s priorities to emerge from collective action rather than from a top-down hierarchical implementation.

Open and social organization must be reflected in managerial-level tasks that enable ongoing input from all individuals but still respect the responsibility of leaders to make decisions and be accountable for the performance of their departments and institutions. Yet, what does it mean to engage in open systems with feedback loops that invoke you find the location of a flag with only a camera pointing toward the sky? A group of individuals accomplished this task using “plane routes and star [constellations] to find” it.16 Similar illustrations exist in the MIT Red Balloon Challenge, when ten red balloons were placed across the United States. The winning team found all balloons in under nine hours using social network principles to share information.17 Unleashing this type of distributed and self-organizing intelligence is a vital role of any organizational leadership.

What makes using communal or self-organized knowledge challenging is that the intent of an organization is to organize. The chaotic nature of open-knowledge spaces seems counter to the need for leaders to produce consistent outputs. Fortunately, there are “places to intervene in a system”—places that allow leadership to take advantage of the chaotic creativity of the masses while still pursuing and achieving planned outcomes. As Donella Meadows emphasizes, in human systems like higher education, leadership can rely on several systems-level techniques to intervene or shape the overall performance:
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The varying the speed and quality of feedback

Designing the physical structure of a system (often found in learning commons for students, but not similarly duplicated in faculty commons for interdisciplinary interactions)

Varying the speed and quality of feedback

Enlarging or reducing the flow of information

Altering rules, constraints, and incentives

Revising and clarifying organizational goals

Fostering desired cultural mindsets and values

Complexity Principle #4: Feedback Sensitivity

How do systems of agents exhibit patterns of complexity and higher-order functioning? Perhaps no principle has greater influence on this than feedback. As John Miller and Scott Page have noted, these environments include “a set of diverse actors who dynamically interact with one another awash in a sea of feedback.”

Feedback serves to micro-direct agents, much like Peter Pirolli and Stuart Card’s idea of information foraging or the ways in which ants or bees provide indicators to others. In a systems context, feedback is the central entity that enables a system, regardless of how inefficient it is in its current state, to become more efficient, sophisticated, and intelligent. The key is having methods for capturing and sharing the feedback that is generated as agents and systems coevolve.

In academic environments, this requires the intentional development of numerous feedback mechanisms that are grounded in sense-making theory and anthropological methods to provide the clearest insights for culture change. Leaders must understand the existing organizational culture before they can manage effectively in conditions of uncertainty. Feedback mechanisms bring to light the often unanticipated outcomes associated with large-scale change. Hence, as much effort should be placed into feedback planning as in the original planning of a goal or outcome. Consideration should be given to questions such as the following:

1. What are the important things we need to know about this initiative as we deploy it?
2. What are our critical data points?
3. How will we collect and incorporate feedback?
4. Have we structured this initiative in such a way that we can redirect it when we receive feedback?
5. Do we have a clear process for communicating to members of the community how their contributions will be used and how decisions will be made?

The interplay between vision and feedback is critical. A clearly articulated vision should be at times responsive to feedback and at other times resilient to feedback. The managerial processes that determine when feedback is contextually valid and when it is a distraction are central to making decisions in a CAS.

Complexity Principle #5: Agility

August 14, 2003, was a sweltering day in the northeastern United States and southern Canada. Just after 4:00 pm EDT, a series of technological failures resulted in a cascading collapse of the electricity grid, impacting 55 million people in the largest blackout in North American history. A tightly coupled, rigid system exhibits these types of cascading failures due to its inability to adjust or adapt. A key attribute of a CAS is the agility that it displays. In order for any system to become agile, its structure must be able to absorb unintended consequences without cascading failure.

The ability to do so starts with leadership. Leaders of large organizations must engage in plans and models that allow for and encourage adaptation. Unfortunately, in higher education this is difficult to achieve, because colleges and universities form only one small part of a system that resides within larger macro systems. The impact of numerous federal agencies, financial accountability, regulatory pressures, international rankings, connections to industry, financial aid, and more means that a college or university is constrained in its ability to set and chart a dramatically different course from the system in which it exists. However, a mindset of agility can enable leadership to plan and deploy approaches that shape the culture of an organization to embrace uncertainty, tolerate ambiguity, and treat unpredicted outcomes as a springboard for agile responses.

A mindset of agility can enable leadership to plan and deploy approaches that shape the culture of an organization to embrace uncertainty and tolerate ambiguity.

Complexity as a Driver of Innovation

Stuart Kauffman, a theoretical biologist and complex systems researcher, articulated what he termed the adjacent possible—a theory that can also be applied to innovation management.
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The concept of adjacent possibilities represents all the potential designs that are one step removed from the present configuration of a system. In essence, the genesis of an idea resides in its relationship to what is now currently possible. As this idea is brought to fruition, a new possibility emerges alongside additional attributes to the system that can be leveraged for innovations. Most breakthrough innovations don’t happen out of the blue. Instead, they develop from existing ideas that collide with other ideas over the course of time. These so-called innovations are essentially the result of a recombination of all of the existing “spare parts” within a system. Although the number of adjacent possibilities at a given time is finite, as one possibility is explored, more emerge. In this way, innovations are incremental and contextual.

Higher education is a diverse community that is good at generating new ideas. In the case of adjacent possibilities, the outcomes are unknown. To achieve more radical innovation, leaders need to put in place a valued parallel process for experimentation. Some of the best examples of this are places like the Sandbox Collaborative at Southern New Hampshire University (SNHU) and Arizona State University’s Action Lab. In these experimental spaces, higher education leaders are testing ideas that address some of our most pressing challenges for society, including adult reskilling, competency-based education, and underemployment. Although these are large and well-resourced innovation hubs, accessible innovation frameworks are coming out of more traditional places as well. Davidson College, a small elite liberal arts college, has developed an innovation process that provides support for anyone in the college community to experiment with ideas that carry risk.

Leaders should aim for the kinds of environments that create the conditions for exploring adjacent possibilities. Steven Johnson illustrates how these environments “expose a wide and diverse sample of spare parts—mechanical or conceptual—and [how] they encourage novel ways of recombining those parts.” He goes on to explain how “environments that block or limit those new combinations—by punishing experimentation, by obscuring certain branches of possibility, by making the current state so satisfying that no one bothers to explore the edges—will, on average, generate fewer innovations than environments that encourage exploration.”

**Leading Change in Complex Systems**

What does it look like to lead a CAS defined by self-organization? How can a process be guided to result in effective adaptation to a changing context? As society as a whole has shifted to networks, this is an area of interest for business, particularly marketing departments, governments, and any individual striving to bring about change. The levers of influence are no longer centrally held, but they do exhibit patterns that can be influenced.

For higher education leaders to be successful in times of uncertainty, we suggest using a model that embeds the five principles of complexity science noted above within a well-adopted organizational framework for continuous improvement: People → Process → Tools (see table 1).

**People**

People—whether students, academics, or leaders—are the central agents in higher education. Complexity science, espe-
cially when applied to social systems, has models that support cooperation and evolution. Leaders can draw on these models to foster the kind of cooperation that leads to effective change in higher education. Using CAS principles requires looking beyond organizational charts and silos and beyond the walls of an institution in order to see the broader patterns in the continual change. Knowledge is being produced at a scale we have not seen in the past, and complexity science tells us that small, insular systems limit the ability to generate new knowledge that best aligns to the pace of change.

Top-down decision-making by a few will not keep up with this pace. Leaders need access to larger networks that bring a greater diversity of ideas and the ability to divide and accumulate that knowledge. Hierarchical, vertical structures are designed for linear decision-making; what is needed is better coordination and extension of the interactive networks that already exist. Shifting away from organizational charts and toward those networks enables a better flow of information.

Institutions also stand to benefit from greater networking beyond their own walls. The colleges and universities best positioned to succeed and acquire new knowledge will be the ones that can redesign their structures to remove governing constraints and participate in larger networks. To do this, they will need to increasingly promote the networking capabilities and CAS mindsets of their faculty and staff. Large networks require a high degree of trust, supported by ease of communication and low transaction costs.

### Table 1. The Intersection of People, Process, and Tools with the Five Complexity Principles

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<tr>
<th>People</th>
<th>Process</th>
<th>Tools</th>
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<tr>
<td><strong>Networks</strong></td>
<td>Leadership actively connects and promotes within and intra-institutional research projects, exploring novel network models for research, teaching, and governance.</td>
<td>Incentivizing innovations results in research network formation across countries and institutions; explore academic programs that involve multiple institutions.</td>
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<td><strong>Emergence</strong></td>
<td>Leadership supports and solicits novel ideas and creates physical and virtual spaces for idea exchange.</td>
<td>Leadership has clearly detailed processes to capture and share organizational innovations and to communicate how promising ideas are moved toward adoption and scale.</td>
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<tr>
<td><strong>Self-Organization and Social Coordination</strong></td>
<td>Self-organization benefits from leadership promoting a culture of shared governance. Leadership needs to invest in spaces and enable permission for self-organization.</td>
<td>Self-organization is the process.</td>
</tr>
<tr>
<td><strong>Feedback Sensitivity</strong></td>
<td>For leadership, feedback is essential not only for innovation but also for continued evaluation and monitoring of organizational culture.</td>
<td>Organizational processes are in place to solicit feedback and assess the impact on culture.</td>
</tr>
<tr>
<td><strong>Agility</strong></td>
<td>Leadership develops and deploys futures scenarios, actively stress-testing the institution against various future outcomes.</td>
<td>Planning processes that focus less on multi-year plans and more on creating flexibility in processes and mindsets are required here.</td>
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plans and traditional performance management. To encourage greater emergence and agility, and to push their teams beyond a typical checklist, leaders can adopt quarterly and cross-team OKRs (Objectives and Key Results) throughout the institution. OKRs are basically “stretch” goals. The concept started at Intel and Google, with the purpose of challenging teams to focus less on the question “What are we capable of doing this year?” and more on the question “Where do we want to go?” In true complexity spirit, the steps to get there are not entirely clear, so teams make assumptions about the key results they believe will get them where they want to go. The shorter cadence for OKRs allows teams to learn and adjust quickly in conditions of uncertainty.

Standard goal setting is applied when the outcomes are clear and the teams know their limitations. OKRs, on the other hand, are intended to stretch teams in ways that encourage agility and discovery. The process is more self-organized and emergent than a traditional top-down approach. In these ways, OKRs are better aligned to a CAS.

Beyond strategic planning and management, higher education leaders also need to create processes for exploration similar to industry R&D models. Colleges and universities have rigorous processes for incremental change but generally lack the ability and processes to manage bold ideas, where the outcomes are unknown.

**Tools**

If the sole focus of leadership is on efficiency and cost-cutting, the risk arises of setting up structures and accountability measures that do not allow for agility, thereby exposing the entire system to cascading failures. These types of rigid structures limit an organization’s capacity to rapidly respond to an external pressure. In addition to being responsible for strong execution in the present, successful leaders also need to be futurists. In complexity science, idea modeling has been used to explore the effects of variations on existing systems. Advancements in computing make it possible to simulate a higher number of future designs that guide strategy and model the evolution of cooperation. Higher education institutions are increasingly making use of data and business intelligence tools to find efficiencies—data and tools that can also be applied to idea modeling. Organizations like the Santa Fe Institute and the Institute for the Future (IFTF) provide a variety of accessible tools and strategies that support idea modeling and provide professional development for leaders and innovation teams. These models can provide the design criteria to test the effectiveness of experiments in early prototypes.

But how will we know if these models are working? At its core, innovation is about culture change. As we begin testing the ideas coming from our communities, we need ways of determining whether or not these experiments are moving our institutional culture toward beneficial coherence. Getting to the real meaning of change in higher education requires more than what traditional data can provide. It requires a deeper representation of the lived experience made clearer through methods like sensemaking.

The Liberal Arts Consortium for Online Learning (LACOL) is exploring a tool and method called SenseMaker, which offers an additional data layer to address this level of cultural complexity. Understanding whether or not our institutions are responding to external change pressures is a matter of cultural exploration, the assessment of which is complex and may not lend itself to narrowly defined research questions or the measurement of predictable outcomes. SenseMaker is rooted in complexity science, reflecting campus cultures as ecosystems composed of many interwoven systems whose trajectories or outcomes cannot be reliably predicted. Through narratives and self-signification, the tool distributes cognition and reveals patterns that represent a more holistic picture of student, faculty, and staff experiences, often in surprising or idiosyncratic ways. It also enables qualititative research at scale and a higher degree of individual agency and feedback not typically provided in traditional assessment.

For leaders to be responsive to external pressures and guide campus cultures around change, they not only need to become better futurists but also need to listen to the authentic voices within the community and recognize broad patterns. That means being open to narratives, and interventions, that defy our assumptions and predictions.

**Conclusion**

Higher education is rapidly evolving in response to changing economic models, the emergence and growth of startups, declining enrollments, new student profiles, and an increased emphasis on addressing inequality. For leaders and academies alike, this uncertainty and complexity is disorienting. The scope and the speed of change suggest that higher education cannot continue under an assumption of “business as usual.” Instead, a fundamentally different approach to teaching, learning, administration, and research is required. We believe that complexity science offers the best lens to understanding and managing this change. Through
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complexity science, higher education leaders can apprehend and make sense of broad-ranging trends, as well as the urgent need to plan for and provide systemic responses.

Notes
6. For example, see the dLRN lists of publications and projects.
7. Mary Uhl-Bien, Russ Marion, and Bill Mckelvey, “Complexity Leadership Theory: Shifting Leadership from the Industrial Age to the Knowledge Era,” The Leadership Quarterly 18, no. 4 (August 2007).
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The Rising Star Award spotlights rising higher education IT leaders whose records reflect ongoing and exceptional growth in contribution to the profession and increased levels of leadership and responsibility. Moran Technology Consulting, an Educause Gold Partner, is once again proud to sponsor the recognition of visionary IT leaders who are addressing today’s ever-changing campus realities and transforming the strategic role of information technology across higher education.
Richard N. Katz:
For unparalleled impact and influence in higher education information technology; for developing groundbreaking initiatives, such as ECAR, which provides leading-edge insights for IT leaders, decision-makers, and practitioners seeking to advance the profession; for being a consummate bridge-builder between people, institutions, and organizations in the United States and globally.

The 2018 EDUCAUSE Leadership Award is given to Richard N. Katz, Founder and Principal of Richard N. Katz and Associates, to recognize his extraordinary leadership and contributions to the IT profession and the greater higher education community. Richard’s impact not only has shaped the direction of information technology in higher education but also has influenced the careers of generations of IT professionals and aspirants in the United States and around the world.

In his early career, Richard advanced through the ranks at the University of California’s Office of the President, culminating in his appointment as Executive Director of Business Planning and Practices. His broad experience in the management of financial, IT, and administrative services laid the groundwork for the future work he would do as a strategic thinker and leader for both CAUSE and EDUCAUSE. Under his leadership, the University of California received international recognition for innovations in accountability, capital programs, human resources and financial accounting. Richard received numerous awards including the Olsten Prize for innovation in 1986. In the footsteps of UC President Jack W. Peltason, Richard became the second recipient of UC’s Award for Innovative Management and Leadership in 1996.

While Richard was widely known throughout UC and through his many speeches and publications as a volunteer with CAUSE, Educom, and NACUBO, many in the IT community got to know him best as vice president of CAUSE, the organization that merged with Educom in 1998 to form EDUCAUSE. Richard was, in many ways, the face—perhaps even the heart and soul—of CAUSE, and his genuine passion for the work of the association led many IT leaders and staff to find a professional home in CAUSE. As vice president at EDUCAUSE after the merger, Richard continued to cultivate EDUCAUSE as a member-driven organization, demonstrating his mastery in community building. Richard took pride and pleasure in catalyzing connections between people and organizations that might not otherwise find each other. He was a kindling force in all aspects of the growth and development of EDUCAUSE; his executive oversight included the EDUCAUSE annual conference, EDUCAUSE Review and EDUCAUSE Quarterly, and the association’s technology operations, professional development, corporate relations, and research. Richard’s leadership provided EDUCAUSE a solid foundation for its continuing growth in its conferences, publications, and corporate relations functions. Among his most significant contributions to EDUCAUSE was his founding of the EDUCAUSE Center for Applied Research (ECAR), the research arm for the association to study the management, use, and impact of information technology on higher education and to provide colleges and universities with practical information to support their decision-making.

Following his fourteen years with CAUSE and EDUCAUSE, Richard has worked with trustees and regents, policy makers, faculty leaders, and staff in university systems and all segments of higher education throughout the United States and internationally. He has made a significant contribution to higher education through his extensive service on a number of corporate, university, and association governing and advisory boards, including those for Ashford University, the Corporation for Education Network Initiatives in California (CENIC), the Ellucian Executive Advisory Council, the IBM Higher Education Policy Council, the New Media Consortium (NMC), and the Syracuse University School of Information Studies. He has generously shared his expertise by delivering more than 200 keynote addresses and has written or edited seven books—including the groundbreaking Dancing with the Devil (1999) and The Tower and the Cloud (2008)—and more than 75 articles, monographs, and book chapters. Richard’s videos “EDU@2020” (2007), “EDU@2025” (2012), and “Edifice Rex: The Place of Place” (2014) are examples of how his work transcends information technology to raise awareness of higher education’s role in building lives of impact.

Richard N. Katz personifies what it means to be a leader, visionary, innovator, scholar, and entrepreneur in higher education, and he is most deserving of the EDUCAUSE Leadership Award. He has been both a beacon and a bridge-builder in our community, and his influence is evident in the many individuals and institutions that have benefited from the wisdom, guidance, and inspiration he has provided in his capacity as an advisor to higher education.
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The emperor is in his dressing room.
—Hans Christian Anderson, The Emperor’s New Clothes
A s a young graduate student in history in the late 1970s, I was deeply influenced by David Landes’s 1969 book Unbound Prometheus, a history of technological and social change during the Industrial Revolution. Landes’s framework describing the interplay of functional need, technological innovation, and behavioral response has shaped my outlook over the ensuing 40 years.

As an IT professional, I have watched this interplay repeat itself as waves of new technologies arrived on campus. Each new wave seemed to carry with it an obligation for technology leaders and practitioners to reinvent their wardrobes, if not themselves. Every new wave signaled a shift in the required skill set and outlook of those who lead the organization and deployment of information technology.

We can metaphorically imagine the white lab coat–clad mathematicians and engineers who dominated the landscape from the mid-1940s through much of the 1970s. Thin ties, pocket protectors, horn-rimmed glasses, and Hush Puppies helped define the software engineer of the 1970s. The broad introduction of personal computing in August 1981, the spread and interconnection of networks, and the deployment, by the mid-1990s, of HTML, URI, and HTTP brought computation and communication to the office and, increasingly, to the home. The simplification and standardization of web search by Google created the preconditions for a revolution in work, commerce, and everyday life. Wardrobes became nearly as diverse as IT professionals. Larry Ellison, it was noted, wore Armani while Steve Jobs will be remembered for wearing blue jeans and his signature black turtleneck. As the titans of technology conquered each challenge of the OSI’s 7-layer model, information technologies moved from the glass house of enterprise mainframes to everyone’s house. The release of the iPhone in 2007 placed computational power and ubiquitous connectivity in everyone’s pocket.

Every challenge posed in the OSI model was met with a technological innovation. Every innovation, in turn, begat widespread social and behavioral responses—some intended, some unintended. Clayton Christensen and others introduced language and analysis around the notion of disruption—the modern phrasology for this matrix of social and behavioral response. As software applications—like spreadsheets—became refined, entire professions were recast. As search and presentation technologies matured, great libraries became accessible over networks. As worldwide networks were connected and as English became the world’s unofficial language of business, international-scale collaboration became widespread. And as connectivity became truly universal and mobile, core aspects of how we live, learn, interact, work, and do business have shifted.

Wardrobe Changes

While computation and communication continue to have deep and demanding technical challenges, the roles of the IT leader and organization have evolved. This is particularly true in higher education. Outside of computer science departments, IT leaders are no longer the “tinkerers-in-chief”—the inventors of new technologies. As they move their locus of operations increasingly to the cloud, IT leaders also rely less on their engineering sophistication. In broad terms, IT leaders have moved from making things, to running things, to socializing things. As leaders position themselves to play leading roles in socializing technology-enabled change, the question of wardrobe arises again. What are the clothes—that is, the skills—that tomorrow’s IT leaders will need? Are the challenges of socialization so vastly different that yesterday’s IT leaders will in fact have no clothes to suit? Is the IT leadership cadre ripe for a total makeover, or—like Google, Facebook, and others—will we need to find ways for technologists, marketers, and increasingly, ethicists to share a clothes rack? Will IT leaders be accountable for technology’s socialization, or will provosts, deans, business officers, and others play decisive roles?

According to writers for Forbes, the New York Times, and McKinsey & Company, among others, today we are all living in the Age of Big Data. IDC predicts that by 2023, the world will create and replicate 163 zettabytes (163 trillions of gigabytes) of data annually. This represents a tenfold increase over the annual amount of data generated in 2016. The social and behavioral landscape associated with the technologies defining the Age of Big Data will demand a radically new set of skills among IT leaders and in the IT organization of the future (see table 1).

While the entries on this list of possible priority challenges could be argued, clearly these challenges—and others that could replace them—bear little resemblance to the OSI’s 7-layer challenge model of the 1970s. While the engineering and technical challenges of information technology will never go away, they are increasingly tucked in the realm of making things faster, more reliable, cheaper, and easier to use. Moreover, while many technical responsibilities are becoming more focused on incremental improvement, many are also migrating to corporate research and development organizations and to cloud providers who are leveraging nearly unimaginable scale economics and security capabilities.

When the Anchor of Truth Disappears; or, Seeking Questions Hidden by Answers

Remarkable people have opined on the nature and purpose of the university. Thomas Jefferson argued that universities exist to form “the statesmen, legislators and judges, on whom public prosperity and individual happiness are so much to depend.” William Harper, the founding president of the University of Chicago, stated that the mission of the modern university is to “maintain for democracy the unity so essential for its [democracy’s] success.” Thought leadership, the search for truth, and Woodrow Wilson’s spirit of service are the pillars that have both supported modern higher education and imbued the university enterprise with special
standing in local, regional, national, and global life.3

We should recall that the search for truth both drives academic inquiry and underpins its skepticism. It spans the disciplines. The mathematician Blaise Pascal advised, “Nothing gives rest but the sincere search for truth.” B. H. Liddell Hart agreed: “The search for truth for truth’s sake is the mark of the historian.” Linus Pauling described science as “the search for truth,” while Alwar Balasubramanian identified artists as “the root of a tree. They can search for truth or reality in their own way.” This search for truth is the glue that holds the disparate elements of academic inquiry together and is the basis of mutual comprehension, purpose, and respect across diverse academic disciplines.7

If the university is a servant of the truth, a beacon of the truth, a sanctuary of truth seekers, and an enabler of future generations of truth seekers, what will happen if the anchor of truth disappears? More specifically for us, what is the role of information technology and of IT leaders in protecting, preserving, or even extending what the theologian Cardinal John Henry Newman described as the university’s role in teaching students “to think and to reason and to compare and to discriminate and to analyse”—that is, to separate the true from the “fake”?8

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constrained) by information technologies. As the professor and philosopher Marshall McLuhan warned: “The more the data banks record about each one of us, the less we exist.” His friend John Culkin reminded us: “We shape our tools and thereafter they shape us.” As we have moved from McLuhan’s typographical age deeply into the electric/electronic age, more and more of his concerns and predictions have shaped our environment.

McLuhan was never more correct than when he cautioned: “A point of view can be a dangerous luxury when substituted for insight and understanding.” Modern 7x24 newscasting became the canary-in-the-coal-mine social response to challenges overcome by a variety of technologies. The former Fox News host Bill O’Reilly inspired Stephen Colbert’s “truthiness” punditry, which was based on the belief or assertion that a particular statement is true based on one’s intuition or perceptions without regard to evidence, logic, intellectual examination, or facts. The New York Times columnist Farhad Manjoo, in his 2008 book True Enough: Learning to Live in a Post-Fact Society, opined that many of us have begun to organize ourselves into echo chambers that harbor diametrically different facts—not merely opinions—from those of the larger culture. Modern social networks put an ominous accent on McLuhan’s warnings about the dangerous side of individual viewpoints. Bogus virality on social media enabled the reputation-damaging PizzaGate scandal and the Russian planting of divisive posts on Facebook in 2016. In the summer of 2018, more than 20 people were lynched by mobs in India as a result of child-abduction rumors spread via WhatsApp. In July the social media app was modified to reduce the pace of forwarding messages. Online mobbing and storming have also led directly to the editorial repudiation or scrubbing of articles in the Business Insider and The Nation. In July 2018 the actress Scarlett Johansson “respectfully withdrew” from a controversial film project in the wake of a forceful Twitter storm.

IT leaders—for a time—flew below the radar on issues like these. While they led institutional efforts to acculturate incoming students to net citizenship, shaped network bandwidth, opened or closed ports, and filtered content from dubious sources, IT leaders preferred to think of themselves as network providers. Such providers, they reasoned, bear little responsibility for the content or community behaviors that travels across the institutional networks. But as we have all witnessed with the recent market drubbing of Facebook, providers of social networks are now at the center of debates about the ethical and appropriate management and uses of information technologies and content. Though IT leaders do not want to become the thought police for higher education, they can no longer remain outside these policy debates.

The pitch of these debates will rise as so-called third-wave technologies find their way into broad adoption. Increasing use of video surveillance and progress on facial recognition will surely both improve campus security and raise issues about privacy, free speech, and the limits of loco parentis monitoring. One wonders how the free speech movement might have played out under the watchful eyes of modern surveillance. Smart buildings and embedded sensors will log the paths of students, faculty members, and staff on campus, leaving a record of their collegiate experiences. Adaptive learning tools are showing dramatic learning results at Georgia State University, the University of Central Florida, and elsewhere, but they depend on large datasets of student work and raise privacy concerns. And while adaptive coursework can unearth students’ behavior patterns and nudge students toward effective learning strategies, many educators worry that the increasing reliance on algorithms and automated responses will promote formulaic or even rote approaches to learning.

Ivory Tower or Tower of Babel?

In the end, the outcome of the debates about how, whether, and when any specific institution is to socialize emerging information technologies may be less consequential than the debates themselves. In many ways IT leaders have seen how the networks they have engineered and operated have become higher education’s public square. For many of today’s public speakers, mobile devices and networks have replaced makeshift podiums and megaphones. Tech-savvy opinion shapers can now project information (or disinformation) across campus or across neighborhoods, cities, states, and nations, tilting opinions (or voting patterns) or
inspiring and choreographing spontaneous mobs.

Technology tools have the capacity—as Bill Gates warned—to create filter bubbles. Technology such as social media “lets you go off with like-minded people, so you’re not mixing and sharing and understanding other points of view. . . . It’s super important. It’s turned out to be more of a problem than I, or many others, would have expected.” Filter bubbles make it possible for technology users to become separated from information that disconfirms, and from people who disagree with, their viewpoints. Our technologies and the bubbles they enable risk isolating us culturally and ideologically. Isolation and the echo-chamber effect, in turn, can lead to tribalism. Intellectual isolation and tribalism—while sprinkled throughout the history of higher education—are antithetical to nearly every conception of the university and erode the capacity of those in higher education to uncover truths. When combined with uneven student information literacy and abundant fake information, intellectual isolation and tribalism splinter our institutional communities, stoking—rather than extinguishing—the fires of intolerance that seem to plague modern society. It is a sign of the times that John Ellison, dean of the College at the University of Chicago, felt obliged to remind the entering class of 2016: “We expect members of our community to be engaged in rigorous debate, discussion, and even disagreement. At times this may challenge you and even cause discomfort.”

As higher education embeds artificial intelligence (AI) or installs intelligent speakers throughout its dormitory rooms or injects other technologies into student prospecting, loan counseling, crisis hotlines, and classrooms, commonplace objects and processes will take on increasingly “black box” aspects. In some respects, institutional processes—including teaching—will become like autonomous vehicles. The processes will get most people where they’re going, but few people will understand how they got there. Between now and then—and certainly when objects and processes fail—issues will surface, opinions (informed and otherwise) will proliferate, and tempers will flare. Emerging technologies raise grave issues, carry significant risks, and beg consequential choices. Recently, more than 1,400 Google employees signed an internal petition decrying the company’s secret efforts to censor a fact-limiting browser being readied for use in China. A similar protest prompted the company to cease defense-related contracts with the U.S. Department of Defense. AI “bug hunters” at DeepMind Technologies are chronicling myriad examples of algorithms that are doing what their builders said but not what they
wanted. Such algorithms take shortcuts that their creators had not thought to define as off-limits. As Tom Simonite put it in Wired: “Teach a learning algorithm to fish, and it might just drain the lake.... If a neural network managing an electric grid were told to save energy... it could cause a blackout.”

How any specific institution will approach socializing these new and fraught technologies—amid possible pitchforks and torches carried by the academy’s righteous and fearful—may depend on the CIO. The CIO has always kept an eye on the possible: on the vision of how information technologies can enable or even transform core institutional activities. Even more, the CIO can create or support an institution’s capacity to see inside the black box. And most important, the future CIO must become the great communicator—not only of the capabilities and workings of new black boxes but also of the strengths and shortcomings of these technologies in the social and political context of the institution.

To succeed, this future CIO must

1. be deeply attuned to institutional history, mission, and culture;
2. employ a governance that informs and confers credibility on CIO actions that increasingly brush against the soul of the institution;
3. be a keen listener;
4. have the ability to communicate complex technical ideas and concepts in ways that lend compelling meaning to the institution’s social and political context;
5. connect what is technologically possible to the student experience, the institutional outcomes, and the vitality of the institutional community; and
6. ensure fidelity to higher education’s first principles—that truth seeking is mission-critical and that divided houses fall.

The CIO’s new clothes are not wholly new. Even as those of us who still cherish or even wear Hush Puppies make for the profession’s exits, we are being succeeded by professionals who are attuned to their institution’s heartbeat and who possess many of the skills outlined above. Likely, ethics is the CIOs next sartorial frontier. Forty years ago, when Reed College CIO Marty Ringle taught a course on the ethics of technology, he “went to great lengths to emphasize that the thrill of inventing new technologies needed to be tempered by an understanding of how those technologies might alter society and impact individuals.” Today, Ringle warns: “The need to be mindful of the ethical implications of what we do—especially in education—is greater than ever.” Former CIO Susan Metros agrees: “As IT professionals, we need to provide services and invent tools that will help students sort through the moral and ethical issues of seeing while questioning whether to believe.”

So much more can be—and will be—written about how the technologies shaping the Age of Big Data are, in turn, shaping us. As we read about the unfolding of events such as Facebook’s privacy debacle, or the censoring of search by Google in China and elsewhere, or the Russian tampering with U.S. and other elections, or the rise of cybermobs or cyberbullies or filter bubbles, it is easy to become dispirited or downright dystopian in outlook. AI is highlighted here because, in part, it is such an easy target for those of us who have borne witness to a few of the unintended consequences of information technology over the years. As with automobiles, information technologies are becoming more powerful and more reliable. And as with automobiles, information technologies are becoming scaled systems. Their internals can be understood only by the certified high priests or priestesses of IT. It is also becoming less obvious who is in control of the human/technology interface at any given moment. Is your car driving, or are you? Is that a TA you are texting, or is it a teaching bot? It is likely that just as the “e” is dropping from e-commerce or e-learning, the word artificial will drop as we discuss intelligence. At some point, we are simply unlikely to know or understand the sources of our own knowledge.

The things we cannot see and do not understand often frighten us the most, especially when potent technologists—such as Bill Joy—warn us that accelerating technological change could cause something like the extinction of human beings within two generations. IT leaders must evolve. They need another wardrobe upgrade. They must become those priests and priestesses who can see what’s in the black box. They must understand how what they see inside the black box connects to not only the mission of their institutions but also their institutions’ cultures, leading characters, aspirations, and communities. They need to mind and respect their institutions’ ethical guard rails. And they need to become the great explainers whose credibility and standing can promote either caution or experimentation, when appropriate.

Maybe now is the time to ask professional organizations and philanthropic foundations to join forces to create a kind of Underwriter’s Laboratory for educational technology. Maybe there is more to techno-skepticism or techno-evangelism than shouting across filter bubbles. Maybe we should not fully entrust the education of young people to the marketing hype of well-intentioned edupreneurs and edupunks. Maybe we can collectively organize the technical capacity to look “under the hood” of emerging technologies and verify (or not) that these technologies perform the functions represented by their creators in the marketing literature. With testing and certification as a foundation, maybe we can sharpen our current research agenda’s focus on the keys to effective socialization of technologies. The potent combination of testing, certifying, and guiding the socialization of emerging technologists will surely help both the eager early adopter and the die-hard skeptic. In any case, more information cast in clear terms could both enable the communicator and lower the possibility of the debate’s polarization. Situating such information in both ethical and cultural contexts is key.

Paul LeBlanc, president of the University of Southern New Hampshire (SNHU), makes a compelling prediction: “We will
need as many ethicists and sociologists at EDUCAUSE gatherings as IT staff and edtech vendors.  

With machine learning ahead of us, the pace of technological change is about to quicken. It is not likely than any of us will be able to keep up. If we lose the capacity to deeply influence the adoption and socialization of technologies at our higher education institutions, we risk becoming just another opinion echoing inside another filter bubble. The stakes are high. As Ringle said: “Let’s not screw it up.”

Notes
12. John (Jay) Ellison, “Dear Class of 2020 Student” (letter to the University of Chicago undergraduate student body), n.d.
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The 2018 EDUCAUSE Leadership Award recognizes Celeste M. Schwartz, Vice President of Information Technology at Montgomery County Community College (MCCC), for dedicating her wide-ranging leadership to the profession of higher education information technology, for enabling the efficient and effective use of technology in support of student success, and for serving as a role model to women and other aspiring technologists in the profession.

From the time she stepped onto the MCCC campus in 1968 to begin her own educational journey as a computer science student, Celeste has felt a deep connection with the place she would serve for decades to come. She is regarded as an exceptional leader whose commitment to and passion for service is both unmatched and contagious.

Celeste has a reputation as a visionary who has continuously advocated for quality improvements through the adoption of innovative technology solutions. Through its integration of several enterprise systems, MCCC was one of the first community colleges to offer a completely integrated one-stop-service experience for students, thus becoming a model for other community colleges across the United States.

Celeste provided strategic thinking and leadership on several MCCC initiatives that profoundly influenced and improved the teaching and learning experience at the college. In the mid-1990s she collaborated with faculty to define classroom standards that continue to evolve and ensure that learning spaces have modern and effective technology. A decade later, she worked with Apple on the Digital Campus Academy program to deliver widespread course content via the Apple platform. Celeste’s productive partnerships with technology providers and her participation in client advisory communities has allowed MCCC to contribute to the development and functionality of many commercial products and has provided valuable insight for vendors from a community college perspective.

High performance and exceptional dedication to the students and her community are the hallmarks of Celeste’s career and the attributes she cultivates in those who work on her team. Over one-third of the IT team members on her staff are MCCC graduates, many of whom began as interns in Celeste’s department. As a result of Celeste’s organizational skills and leadership, the MCCC IT team has a first-rate reputation and has been recognized by the Center for Digital Education as a top digital community college eleven times, ranking three times as first in the nation. Celeste’s personal approach to coaching others has extended well beyond the campus, as she generously mentors other aspiring technology leaders through her connections in EDUCAUSE and other professional networks.

Celeste has been active in the EDUCAUSE community since 1997 (and CAUSE prior to that). She was a member of the ELI Advisory Board and several event program committees (serving as chair of the Mid-Atlantic Regional Conference Program Committee in 2008) and was a mentor for the Hawkins Leadership Roundtable, among many other volunteer assignments. In twenty years of activity with EDUCAUSE, she has presented as a subject-matter expert on a variety of topics, including analytics and the use of technology to support student success, IT governance, and community colleges. Beyond EDUCAUSE, she has co-chaired the IT Affinity Group, a leadership and technical resource for the CIOs of the Pennsylvania community colleges. She is active in KINBER, the Keystone Initiative for Network Based Education and Research. And she is MCCC’s liaison to Achieving the Dream, an EDUCAUSE partner in advancing the success of community college students.

Celeste M. Schwartz has dedicated her life’s work to the advancement of innovative technology solutions that provide a bridge to student success. She is a tireless worker, empowering leader, and valued resource to all with whom she works, both locally and across the nation, and it is fitting to recognize her significant contributions to the profession with the EDUCAUSE Leadership Award.
QUICK TALK

EDUCAUSE Review: How did you get your start in the higher education IT profession?

Schwartz: I got my start in higher education upon graduation from my local community college with a job offer to be a keypunch operator. My goal was to obtain a four-year degree in business administration, and the community
college position offered a benefit to cover costs of subsequent college-level courses. I worked full-time as a key-punch operator during the day and attended St. Joseph’s University during the evenings for the next two years. In the early years, it was my intent to leave higher education for a corporate job. However, with each corporate offer, coincidently, came greater opportunity and promotions within Montgomery County Community College. Seven years into my career at MCCC, I was offered the opportunity to lead the IT department, and from that moment forward, I fell in love with the mission of the community college.

**EDUCAUSE Review:** Did someone inspire you to leadership?

**Schwartz:** Two mentors stand out in my early years. The first was a data-processing faculty member who supported me throughout my associate degree and in acquiring my first job in the field. The second and most significant career mentor, the dean of administration at MCCC, came early in my career and provided me the opportunity to lead the IT department at a very early age. This was also at a time when other college leaders believed that IT departments should be led by men. The dean mentored me over the next three years of his time at MCCC and throughout his retirement. It was through his encouragement that I learned that there was more to the job than providing a great infrastructure and reliable administrative and academic systems. He ensured that I understood the expectations of the leadership team and helped to prepare me to sit at the leadership table. His passion for the community college mission was evident. He demonstrated the importance of the open-access, community mission and the long-term importance of providing higher education opportunities throughout our country.

**EDUCAUSE Review:** When you think about your career, what lessons learned would you pass along to those starting out in this field?

**Schwartz:** Looking back at my career, I realize that a significant milestone occurred three years after I took on the leadership role in the IT department. With the appointment of a new president at MCCC and my completion of a master’s degree in computer science, I was appointed as one of a six-member leadership team reporting to the new president. Since then, while the presidential leadership has changed over the years, I have been fortunate to remain a part of the president’s leadership team for over three decades. Reporting at this level of the organization gave me an early opportunity to learn the inner workings of a community college.

For those starting out in the field, I am sharing what has worked for me throughout my career: be truthful, have high ethical standards, understand and support your institution’s mission, keep learning, demonstrate value to your institution, leave your ego at the door, run your IT organization with a service mindset, solicit ongoing feedback and build your IT organization’s improvements based on that feedback, listen closely to what is and is not being said, be a good observer looking for opportunities to add value to the institution, and most importantly, place your focus where it matters most, on doing what is best for your students.

**EDUCAUSE Review:** What have been your greatest accomplishments?

**Schwartz:** I have a few accomplishments over the years of which I am very proud. First is assembling an amazing team of IT professionals who all put students at the center of their work. More recently, I am most proud of my work around the involvement of information technology in student success. About six years ago, I had the opportunity to co-write a Bill & Melinda Gates Foundation grant that supported the design and implementation of integrated planning and advising systems. The VP for Student Affairs had just completed a redesign of the advising process, and we were able to overlay technology systems onto the new advising process flow in a way that enhanced the college’s delivery of support for student success. Some said we were lucky to have received the grant, but I believe it had more to do with that fact that the design was a collaborative process among faculty, advisors, and administrators. The grant set the stage for a new era of providing student success services while also fostering a culture shift within the college. The IT team supported the implementation of the new systems, and our collective IPAS (Integrated Planning and Advising Services) team was successful in receiving round two funding to continue this work. While the grant has
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ended, MCCC’s work on student success initiatives is ongoing, with the IT team continuing to be a significant supporter and contributor. Finally, I am also very proud of my part in creating a college grant to help female CIS students gain valuable IT work experience in the technology infrastructure area.

**EDUCUSE Review:** What changes have you seen in EDUCAUSE and the higher education IT community over the years?

**Schwartz:** In the early days of EDUCAUSE, we saw a focus on specific technologies and on research around the use of those technologies. EDUCAUSE conference attendees were more likely representing research institutions, large four-year colleges, and two-year college systems and were serving IT staff in infrastructure, administration systems, academic systems, IT support, library staff, institutional research staff, and academic faculty. Over the past several years, however, we have seen an increase in the number of smaller colleges, international institutions, and community colleges participating. We have also seen a significant shift in the annual EDUCAUSE Top 10 IT Issues lists, with higher rankings assigned to student success initiatives, thereby increasing the number of student affairs staff attending EDUCAUSE meetings. EDUCAUSE is attracting more cross-functional teams, aligning with the changes we are seeing across higher education. As the IT department starts to become a more collaborative, supportive arm of institution and align with other departments to deliver institutional strategic priorities, the numbers of those attending EDUCAUSE from other departments will increase. I have also seen much greater participation in and expansion of the EDUCAUSE online communities, a significant increase in information and research made available via EDUCAUSE, and more emphasis on data and data sharing. EDUCAUSE is not just an organization that supports technologists but, rather, is an organization that is important in the advancement of higher education institutions as a whole.

**EDUCUSE Review:** How can we prepare ourselves for the higher education IT challenges ahead? What do you see coming in the next five years?

**Schwartz:** To be successful with future IT challenges, we need to remain flexible, understand that the pace of change will continue to accelerate, and realize that the expectations of end-users will continue to expand as technologies remain embedded in our everyday lives. I expect that we will always be challenged with budget and staffing constraints, information security and privacy, and talent shortages in data science and information security. Over the next five years, I anticipate greater adoption/integration of artificial intelligence, smart buildings, virtual reality, and cloud services. I also expect to see a razor-sharp focus on the user experience and on increased options for self-service.

**EDUCUSE Review:** What is one characteristic that you believe every leader should possess?

**Schwartz:** Former U.S. President Dwight D. Eisenhower stated, “The supreme quality of leadership is unquestionable integrity.” Selecting a single characteristic is not easy, since I believe that great leaders require several characteristics. But I would say that honesty and integrity top the list. Leading a higher education IT organization is an interesting, challenging, and fulfilling career. I remain passionate about my work, knowing that I have had the opportunity to make a difference that has positively impacted students’ lives.
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The 2018 EDUCAUSE Community Leadership Award is presented to James Phelps, Director of Enterprise Architecture and Strategy at the University of Washington, for his unique and remarkable contributions to information technology and the higher education community, including his prescient understanding of the importance that enterprise architecture will have in both commercial and academic enterprises.

Jim's strong sense of giving back to the community and contributing to the common good was present in his early career choice to work on medical products to assist in the treatment of brain tumors. Building on his passion to employ technology in the service of others, Jim returned to higher education and, over the past twenty-four years, has served in a variety of roles and across multiple institutions and organizations. Each step of his journey has brought increased responsibility and expanded leadership.

During his work at the Biological Computing Consortium at Oregon State University, Jim promoted a holistic vision of information technology, working collaboratively with staff and researchers to develop a suite of services in support of his vision, guiding the organization to new funding and staffing models, and developing pathways to larger opportunities and success. When Jim's career led him to a position as an enterprise architect at the University of Wisconsin–Madison, he worked with key university leaders to promote a deeper understanding of the strategic role that information technology could play in the university's mission and established a series of IT solutions that fundamentally changed the ways the university conducted its business. He also worked to build deep collaborative partnerships between the administrative units and the IT organization to improve the student experience.

While at UW–Madison, Jim worked with Internet2 to help spread knowledge and teach best practices surrounding the emerging issue of identity and access management. These efforts led him to work with the leadership of Internet2 and EDUCAUSE to found Itana (so named for its focus on IT Architecture iN Academia). Jim's vision for the organization has guided Itana through an expansion in both its focus and its membership—from a small group at its inception to a current group of over 700 active constituents. And Jim's masterful facilitation of the group has created in Itana a program that engages its participants in face-to-face gatherings and every-other-week call-in programs.

In his current role as Director of Enterprise Architecture and Strategy at the University of Washington, Jim is building on his deep understanding of enterprise architecture and the field's changing and exceedingly more critical role in today's business transformation. Having served as a coach and mentor to many other enterprise architects over the span of his career, he recognizes the need for diversity in both technology and architecture services and is promoting outreach efforts. These include the EDUCAUSE Women in IT Constituent Group, with the hopes of increasing the number of women in architectural leadership roles.

Jim has been a strong advocate of EDUCAUSE through his writings and his participation at conferences and in constituent groups. Beyond EDUCAUSE, he has contributed across the professional landscape through his involvement with Internet2, Itana, the Committee for Institutional Collaboration (now called the Big 10 Academic Alliance), the Common Solutions Group, and countless other higher education collaborations. He uses his hard-won experiences to mentor others individually, to support leaders of other EDUCAUSE Constituency Groups, and to advance emerging initiatives such as the work Internet2 is doing in the Internet of Things.

Today, higher education is far better prepared to realize the opportunities afforded by information technology due to Jim's extraordinary leadership. He has focused on contributing to the greater good of the people and organizations around him, making James Phelps a community leader in the truest sense and worthy of the EDUCAUSE Community Leadership Award.
EDUCAUSE Review: Why did you decide to build Itana? What motivated you to take on that work?

Phelps: I saw the complexity of the problems that higher education faced—the growing complexity of the technical landscape and the rapid changes due to
the internet and World Wide Web—and I thought: “The future of higher ed needs to be architected.” I knew that we needed to design modern solutions and that doing so wouldn’t be easy. I also knew that there were not enough IT architects in higher education. So I reached out to people I knew in Internet2, EDUCAUSE, and the Common Solutions Group (CSG) to find a small core group to start this work and to establish a support structure for the effort.

**EDUCAUSE Review:** How can we build communities to solve our common IT problems?

**Phelps:** About the time that I worked to found Itana in March 2007, I read “The Cathedral and the Bazaar,” by Eric S. Raymond. I was taken by the idea that one person’s intractable problem may have already been solved by another person. The open-source concept was gaining notice. Higher education has always had a culture of collaboration and community. What I thought, back then, was that we could share the heavy lifting. The higher education community is unique in that we are not in competition in the same way that businesses are. We don’t protect our every advance or every idea as intellectual property. Give a compelling problem to a wide group of people, and some will engage to do the heavy lifting. They will be inspired by the mission.

Finally, we need to develop the next set of leaders. We need to increase the diversity of enterprise, business, and technical architects. Communities are places where individuals can find coaches and mentors. We need to create communities to build the future leaders of higher education.

**Phelps:** Being the solo champion is fine in the beginning. I led Itana for the first three or four years as the community grew. I found I had a few individuals who would always step up. As Itana grew, I decided it was time to build a steering committee to spread the work. The members of my steering committee are absolutely critical to the success of Itana. Itana would never have been as successful without them. They are a force multiplier. They bring great ideas to the table, as well as new networks and extra hands to solve problems. They share the heavy lifting.

**EDUCAUSE Review:** Do you have suggestions for gaining institutional support for community work?

**Phelps:** One thing I do is take ideas that I learned in the community (from Itana, EDUCAUSE, and CSG) back to my institution and tell my colleagues, for example: “This is a great idea that came from Michigan. I learned about it on the last Itana call.” This helps my leadership see the value of my being involved. I also look for colleagues I think would gain from engagement with the community and bring them along to meetings, using this opportunity as a foundation for coaching and career planning. I think this has made leaders at my institutions happy to have me involved. What I gain gets spread widely.

**EDUCAUSE Review:** Are there specific projects you are particularly proud of?

**Phelps:** Last year, we asked Beth Schaefer to step into the role of Outreach Officer for the Itana Steering Committee. I loved the calls we had with EDUCAUSE constituent groups like Women in IT, Diversity in IT, and IT Service Management. I’m really proud that the committee took to heart the idea of building bridges to other groups and that this has become a core value of Itana.

**EDUCAUSE Review:** What is your secret for successfully balancing institutional leadership with service to the community?

**Phelps:** I don’t think they are that separate. I lead in the community to get feedback on things we are working on in the institution and to bring great ideas from our partners back to the institution. I use the community to coach and
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mentor young professionals in the IT organization. I look to help those who are interested and engaged. Community leadership and involvement doesn’t take that much time, and I think the value far outweighs the cost.

For example, I was on the EDUCAUSE Digital Transformation Task Force. I learned so much, and this work helped ground my thinking. When I returned to my institution, I put together a talk for our senior leadership team. What I shared helped set the stage for a day-long strategic planning effort.

**EDUCAUSE Review:** What do you find most rewarding when it comes to community leadership?

**Phelps:** Watching people rise to new leadership roles and activities. When the person who has been a lurker on conference calls for months suddenly says, “I’ll help with that” and then steps up and shines, eventually taking on leadership roles for the next working group. You can see the potential and just wait for it to be realized.

I’m also incredibly proud of the work that Itana members are doing, for example, on the internet of things, the Enterprise Architecture Maturity Model, and the long-running API Management Working Group. All of that has little to do with me. I enjoy watching the community come together, form into working groups, and then do good work.

Finally, I love hearing about the breadth of work and experience of community members. With so many great efforts going on across higher education, it is marvelous to get to sample some of them.

**EDUCAUSE Review:** Do you have advice for the next generation of community leaders?

**Phelps:** There is a lot I wish I had known. First off is how much you learn by leading a community. People are afraid, I guess, to present to the community. They feel like they have to be “done” or have a perfect answer. I get such great feedback on my half-baked ideas.

Also, leading a virtual community helped me lead face-to-face meetings back at work. Nothing is as hard as getting a group on the phone to engage. Once you get the hang of that, you can get a room of people engaged pretty easily.

My advice? Just step up and lead. You will learn to lead, you will learn about your area of practice, you will learn about people. And you will find compatriots who are dealing with the same problems that you are trying to solve. Someone may even have already found the solution.

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The EDUCAUSE Rising Star Award for 2018 is presented to Damian Doyle, Assistant Vice President of Enterprise Infrastructure Services at the University of Maryland, Baltimore County (UMBC), to recognize his steady progression of achievement within UMBC and his expanding influence in the profession as a role model for collaborative partnerships to achieve success.

Damian's connection with UMBC began when he was a student and scholar in the university's Honors College. He was a student employee in the Division of Information Technology (DoIT) and joined the department full-time upon his graduation. Over time, he distinguished himself by taking on some of the university's most foundational and difficult technical assignments, beginning with supporting the NSF grant to implement the vBNS (very high speed Backbone Network Service, which later formed part of the backbone of Internet2) and continuing with his leadership on numerous other projects to establish or upgrade the technology to support the educational process and maintain network security on campus.

In recent years, Damian was promoted to director, senior director, and recently Assistant Vice President of Enterprise Infrastructure Services (EIS) and also assumed responsibility for support for the university's high-performance computing facility. In this role, he has led campus efforts to move to cloud services and has spearheaded efforts to prepare technical staff in their support of this move. More recently, Damian closely collaborated with staff involved in business services, enrollment management, and institutional research to help manage upgrades to Amazon Web Services involving the university's financial and analytical platforms.

On a campus with a strong tradition of staff participation in community-shared governance, Damian stands out as an especially insightful and effective leader. Serving as the first UMBC Professional Staff Senate president to come from DoIT, Damian has exhibited an inclusive and positive leadership style that has inspired trust and collaboration as the staff and campus community face complex challenges. He has made key contributions on several high-level committees and groups on campus, always demonstrating an outlook that is thoughtful, substantive, and collegial.

Damian's commitment to UMBC's ethos of “inclusive excellence” resonates through his work to expand opportunities for under-represented groups in all disciplines. Damian serves on the internal board of UMBC's Center for Women in Technology (CWIT) and has collaborated with CWIT to develop internship programs for women and minority student employees with DoIT. As part of this same effort, CWIT students gain valuable hands-on experience working in the university's cybersecurity, Unix infrastructure, and advanced networking teams—all to help prepare them for their future careers. Damian also volunteers extensively with Maryland's First Lego League, serving as the chair of the state planning committee and one of the head referees at competitions throughout the state.

Damian has participated in the EDUCAUSE Management, Leadership, and Leading Change Institutes, as well as contributing to the Cloud Computing Constituency Group and the ECAR Cloud Working Group. He has also presented in or moderated several sessions at EDUCAUSE conferences and has served as a reviewer for both the Connect and the Annual Conference Program Committees. He will be among the first faculty cohort in next year's EDUCAUSE Institute program for senior directors.

Damian's demonstrated technical and managerial aptitudes in an academic computing setting, as well as his commitment to the promotion of diversity and inclusion and his consummate focus on building relationships as a bridge to working collaboratively to leverage technology, make Damien Doyle worthy of recognition as an EDUCAUSE Rising Star—and as a leader who has much more to contribute to the higher education IT community.
EDUCAGE Review: Who inspired you when you started in your career, and who inspires you now?

Doyle: Early in my career, my love of technology is what inspired me. Whether it was consumer electronics, innovations in networking, or computing, I always loved how technology could...
translating and connecting. I credit my parents, especially my father, for that love. He worked with computers as a hobby and in his job, and he involved me from an early age in understanding how they worked. He inspired me to want to know more and to appreciate things for how they were made and designed, not just for how they functioned. My mother’s leadership and guidance have also been a constant inspiration to me throughout my life; from her I got my love for education.

What inspires me now are the unbelievable people I get to work with and learn from every day. The people within higher education and their stories, passions, and dreams have a huge impact every day on my thinking and motivation. I’m continually impressed by the challenges many students have overcome to get where they are, and by the faculty, staff, and colleagues who are changing lives through their work, their research, and their commitment to education. The more people I talk with, learn from, and connect with, the more inspired I am to help them succeed and achieve their goals. The best part is there are always new stories, and new people, to be inspired by.

Another source of inspiration these days is my son, Leo, who has helped me transform in higher education, until recent years I didn’t take advantage of many of the things that make it such an amazing environment in which to work. In higher education, we are constantly immersed in some of the most forward-thinking, innovative, and diverse environments in the world. Regardless of what your job is, it’s incredibly important to step outside of your role and be involved in what is going on throughout the institution—whether that means attending events on campus, helping a student organization, actively participating on a campus committee, or collaborating with other professionals throughout the community. I’ve been teaching classes recently, and that has connected me with students and other faculty in an entirely new and extremely rewarding way.

These connections can help rejuvinate you and keep you motivated and focused not only on your job but also on what makes higher education so amazing. It is often too easy to say we are busy and just keep our heads down, working hard. In the end, being part of the larger community and taking advantage of our unique opportunities will help us understand who we are serving.

In short? Stay connected and involved, and take the time to appreciate what a truly unique, remarkable environment we are privileged to work in.

EDUCAUSE Review: What advice would you give to those who are just getting started as IT professionals in higher education and to other “rising” leaders?

Doyle: One of my biggest regrets is that while I have spent so much of my life doing that, I wish I had known, earlier in my career, about the information and knowledge they provide. Lastly, surround yourself with really smart and driven people, listen to them, and always be willing to learn.

EDUCAUSE Review: What can others in our community do to support young IT professionals?

Doyle: For me—and I think this is true for most other young IT professionals—there is a drive to innovate, to do new things, to solve interesting problems. To that end, leaders can be very deliberate about making sure that people have ways to grow and be challenged, ways that resonate with them as well as benefit the institution. I feel it is incredibly important that we find more ways to connect people early in their careers to the mission of higher education and to the community that exists outside of their daily jobs.

The IT organization can be very siloed, and many of the early career roles lend themselves to back-office work away from students, faculty, and much of the campus community. Managers and leaders need to be intentional about freeing up time to help jumpstart opportunities for development in younger staff. Too often these opportunities are reserved for staff later in their careers, and we are missing a great chance for new ideas if we wait. If we can help broaden younger professionals’ access to new ideas and different ways of thinking earlier in their careers, we would all benefit from a great infusion of innovative ideas that would help drive change.

EDUCAUSE Review: What are you doing to ensure that you continue to grow and develop as a leader?
Doyle: Two things immediately come to mind. I try to (1) never stop learning, and (2) make a point of taking risks and putting myself in situations that make me uncomfortable. Part of learning goes well beyond reading and staying up-to-date on technology; you have to be willing to listen and to take the time to connect with people. Relationships and trust are the foundations that good leadership is based on, and you will learn more from connecting with people from all parts of higher education than you can through any other method. Find colleagues and friends, both internally and externally, who will not only support you but also challenge you to be better and think differently.

In terms of taking risks, I shied away from this early in my career, and I wish I had been braver. I finally decided that if something made me uncomfortable (e.g., public speaking or volunteering), or if every part of me was saying “Oh geez, I don’t want to try that,” I would immediately raise my hand and take the risk. This has led to so many amazing opportunities and rewarding experiences that I couldn’t list them all even if I tried. Taking risks was not, and is not, easy. It is scary and unnerving, and I often immediately think, “What did I just do?” That being said, taking these risks has changed how I think and act in almost every aspect of my life and my career. It has also affected how I work with my son as he is growing into a wonderfully kind, caring, and thoughtful young man. I work with him to be braver and more confident than I was at his age, to realize he has valuable ideas to contribute, and to act with confidence—never hubris, but with humble conviction. I feel every leader and every person should strive to do the same.

EDUCAUSE Review: What is most important for a leader to keep in mind in order to be successful?

Doyle: For me, it is remembering that everything is about relationships, not technology. That is one of the most important lessons I’ve learned over the years. Technology is an amazing, innovative, constantly evolving set of tools, but still just tools. Before you can use technology to solve a problem, you have to take the time to understand the people involved and their core issue. Doing so takes time, patience, and empathy, but it’s worth the effort. If you spend time connecting with people across the institution and listening to their frustrations, drives, and passions, you can learn to collaborate in ways that will resonate with them. In addition, by showing that you understand their concerns, and why they do what they do, you build trust. That trust will often evolve into a partnership. That can lead to an increased willingness to work together, to take risks, and to help drive change. Building that trust can be one of the most challenging but most rewarding parts of the job.
**TECHNOLOGY EXPERIENCES**

Across higher education, at least three-fourths of students rate their overall technology experiences as good or excellent.

- 80% for AA
- 81% for BA
- 75% for MA
- 77% for DR

Technology has been incorporated into the lives of students, academically and otherwise. Only 2% of off-campus students don't have access to the internet at home. Instructors are also using students' technology as learning tools.

- ¼ of students say their instructors have them use their own smartphones or tablets in class.
- ½ of students say their instructors have them use their own laptops in class.
- 2/3 of students say their instructors use technology to:
  - enhance learning
  - engage students
  - encourage the use of online collaboration tools

**Blended learning environment 55%**

A majority of students continue to prefer a blended learning environment over one that is either completely online or completely face-to-face.

- Complete online: 7%
- Complete face-to-face: 38%

**STUDENTS AND THEIR DEVICES**

Laptops are still the most important device for students. Nearly all respondents (94%) say that their laptop is very or extremely important to their success. Hybrid tablet-laptop devices (83%), desktops (62%), and smartphones (53%) are also crucial to academic success for the students who own them.

The most common device combination remains laptops and smartphones—89% of students have access to both.

Of those students, 18% also have access to a desktop computer and a tablet—42% report access to neither.
STUDENTS’ USE OF TECHNOLOGY

We identified the pattern of online activity for the typical college student, who tends to do 1-4 hours of homework or research online each day and tends not to play video games. We also identified three additional student types: the gaming student, who tends to be connected almost all of the time; the social student, who is on social media the most but who also studies and watches streaming video a lot; and the studious student, who engages in online activities more moderately.

STUDENT SUCCESS TOOLS

Tools that aid in being a student are useful to the respondents who are aware of them. Students are less aware of tools that help academic performance, such as early-alert systems, but students who are aware of such tools find them useful.

ACCESSIBILITY

Students who have physical or learning disabilities are often unsatisfied with their institution’s awareness of student needs for accessible and adaptive technologies and with institutional support for those technologies. Students with learning disabilities responded more positively than did students with physical disabilities, while students at associate’s and bachelor’s institutions responded more positively than did those at master’s and doctoral institutions.

START STRATEGIC CONVERSATIONS WITH STUDENT DATA

Colleges and universities use the EDUCAUSE Technology Research in the Academic Community (ETRAC) data to develop and support their strategic objectives for educational technology. With ETRAC data, institutions can understand and benchmark what students need and expect from technology. Institutions can use data to improve IT services, prioritize strategic contributions of IT to higher education, and become more technologically competitive among peers. Learn more at http://www.educause.edu/etrac.
In 2001, not long after the creation of EDUCAUSE itself, EDUCAUSE Review published “The Answer is Still Technology—Strategic Technology.” In the article, Milton D. Glick makes the case for the strategic potential of technology, concluding that the real value “is not technology per se but the strategic use of technology.” Based on a small survey of provosts, the article includes a “report card” on the strategic use of technology, and the scores weren’t high. In fact, half the grades were Ds, and “teaching and learning” managed an “incomplete.” In so very many ways, this article expresses hopes, dreams, exasperations, and impatience that could just as easily be quoted in 2018. One theme—that “information technology must be at the table when key decisions . . . take place”—has been repeated every year since. In conclusion, Glick argued: “Traditional higher education may be at an inflection point”—suggesting that the move to more strategic IT will be dramatic. As we continue the 20th anniversary year of EDUCAUSE, now seems a perfect time to consider whether information technology is finally acknowledged (and used) as a strategic asset or whether this realization continues to be an elusive milestone following an anticipated inflection point that somehow never seems to happen.
When it comes to broad, demonstrable acceptance of information technology as a strategic asset, there are—as we say in higher education—“pockets of excellence,” especially colleges and universities that have taken on major digital transformation initiatives with vision from the top and buy-in throughout the organization. On the other hand, some evidence suggests that we may actually be moving in the opposite direction. For example, in the 2017 Campus Computing Survey, the percent of respondents who say that “senior academic leadership understands the strategic value of institutional investments in IT” declined by 10 percent from the previous year. Likewise, the 2017 Leadership Board for CIOs survey reports that board-level involvement in IT governance experienced a “significant drop” from 26 percent to 17 percent—the lowest level of board engagement in four years.2

Our Utility-Focused History
In the history of higher education information technology, a very well-worn witticism is the saying that no one knows information technology exists until something breaks. Dartmouth College Vice President and CIO Mitch Davis suggests that this legacy view expects information technology to be “silently awesome.”3 On the one hand, it’s surely a badge of honor to be the unsung hero who keeps everything going with duct tape and cat-5 cables, but working brilliantly in the background isn’t sufficient today. As Southern New Hampshire University (SNHU) President Paul LeBlanc wrote in EDUCAUSE Review, “The IT organization must be good at the science and sound practice—it’s foundational work—but to successfully face the challenges ahead, the organization must also help lead the way with a creativity and inventiveness it has not always volunteered or been asked to provide.” LeBlanc thinks of technology functioning at three levels:

1. Technology that allows us to do what we have been doing, but do it better
2. Technology that allows us to do what we have been doing, but do it less expensively
3. Technology that allows us to reinvent what we do.4

I would argue that we started to move away from a pure utility perspective in 1999, as we were overwhelmed with worry about the Y2K bug. Y2K created a great deal of hand-wringing and put any number of consultants’ children through college, with $100 billion spent in the United States alone.5 It was a great relief when our CPU clocks turned over to 1/1/2000 without planes falling from the sky or other disasters caused by major software glitches. However, the story that sticks from Y2K is not that technology is dangerous but, rather, that it is all around us. As the chairman of the President’s Council on Y2K, John Koskinen, noted in 1998: “These chips are everywhere.”6 Thanks to the steps taken in advance, the Y2K apocalypse never came to pass, but what was realized was the degree to which technology had become critical and ubiquitous—though still largely invisible.

As EDUCAUSE looks to our next twenty years, LeBlanc’s idea of reinvention involves a transformational capability that requires so much more than technology working well in the background. It

Making the Case: Curves Ahead

Brad Wheeler, CIO and Professor, Indiana University

I am deeply concerned about the (mostly) diminishing influence of the CIO role in the executive leadership ranks at many colleges and universities. For context, three curves are indisputable for the decade ahead.7 The effect of each curve on a particular institution will be somewhat mediated by its wisdom in IT operations and strategy:

1. Higher education will face an overcapacity problem by the end of the next decade as the number of graduating high school seniors falls off precipitously in 2026 and as additional substitutes arise for residential education—particularly for post-undergraduate education.
2. Almost everything foreseeable regarding our mission of research and education will become more technologically-intensive—more dependent on commodity, specialized, advanced, and integrated technologies to achieve that mission within costs that our revenues can sustain.
3. Colleges and universities are not innovating quickly enough or deeply enough with our economic costs and delivery models in the increasingly competitive space of overcapacity, downward price pressures, consumer flight to quality, and efficient substitutes for what we do.

Add to these three inexorable curves the fact that bond-rating agencies are already turning negative on the outlook for our enterprise, and the challenge is clear.

We may well adapt. I am bullish on the ability of the academy to adapt and reinvent itself, as it has done over the millennia. But the pressure to do so this time will become immense and will be measured in years rather than half-centuries. Therein is the essential role for the skilled CIO to work both operationally and strategically to help navigate each institution through the curves ahead.

Note
requires a campus culture that understands the strategic value of information technology, and it requires an IT operation that thinks far beyond operational/utility foundations. In short, what we got us here is a powerful and important utility legacy that can never be ignored, but today we need more.

This tension between utility IT and strategic IT has been a persistent theme in our community, like a tune you just can’t get out of your head. At the 2010 EDUCAUSE Annual Conference, Brad Wheeler and Brian Voss famously debated the dichotomy as it applies to the role of the CIO: is the role one of plumber or strategist? Four years later, Voss talked about how the schism had actually intensified, rather than diminished. He shared his story of how, poised to launch a focus on strategic transformation at his campus, he was forced instead to put on “waders” and grab a “plunger” as the result of a security incident. He concluded, “When plumbing always overwhelms strategizing—when fires always cause a stoppage in our plans to build a sprinkler system—this may be fracturing our profession.” As Voss and Wheeler agreed in their earlier debate, the successful IT leader must be a master of both plumbing and strategy.

**Our Strategy-Focused Future**

Whether or not those we work with acknowledge the thoroughly strategic nature of higher education information technology, currently emerging technologies make it irrefutably clear that technology is silently awesome, is ubiquitous, and is an institutional differentiator that requires the highest level of strategic consideration. In fact, even a cursory review of the most intractable challenges facing higher education in 2018 points to the promise of technology to gain traction and make a strategic difference at the highest level:

- **Student Retention and Completion.** Traction: adaptive learning; technology-enabled advising tools; and technology-enhanced programs that have proven to increase persistence and graduation rates while preserving instructional quality.
- **Teaching and Learning.** Traction: advanced learning spaces; more intense engagement and experiential learning made possible with emerging augmented reality, virtual reality, and mixed reality innovations.
- **Student Affordability.** Traction: reduced time-to-completion; open educational resources; and institutional cost reductions through at-scale, technology-enabled efficiencies.
- **Financial Viability.** Traction: improved sustainability through adoption of new business models (e.g., as done at Southern New Hampshire University and Arizona State University).

Beyond these wicked challenges, perhaps the most worrisome crisis in US higher education is the negative perception held by students, parents, and communities. Although technology innovation alone is unlikely to change these perceptions dramatically, deploying technology that reimagines and enhances the student experience and changing student success outcomes in the ways described above have the potential to make a substantial difference—from prospecting for students through interacting with alumni.

Findings from the 2016 EDUCAUSE Center for Analysis and Research (ECAR) studies of undergraduate students clearly demonstrate that students desire more technology and that technology helps them learn (see figure 1). In the 2017 study, at least 80 percent of students report that each of the student success technologies listed in the survey is at least moderately useful. About 6 in 10 students wish their instructors used lecture capture, early-alert systems, and free, web-based supplemental content more often. Technology offers perhaps the brightest hopes for moving some of the hardest-to-move needles in higher education, including student engagement and (timely) success. For this reason, among others, student success was the #2 issue in both the 2017 and the 2018 EDUCAUSE “Top 10 IT Issues” lists, behind only information security in both years.

And of course, students and parents are the least happy when students start college but don’t finish. With funding provided by the Bill & Melinda Gates Foundation, EDUCAUSE has worked, since 2015, with colleges and universities that are implementing technology-assisted advising tools. Many of these tools have produced concrete results, such as a 3.6 percent increase in overall retention at Colorado State University since 2006 and a 10.5 percent increase in retention at Northeast Wisconsin Technical College. Technology can be incorporated into initiatives and programs to increase retention and completion, reduce time-to-completion, and decrease withdraw rates. There is no better example of strategic technology that supports institutional goals than programs that directly contribute to improved student success and timely completion. Needless to say, we want to advance

**Figure 1. How Technology Helps Students Learn**

<table>
<thead>
<tr>
<th>Percentage of students who say that technology has helped them:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask instructors questions</td>
</tr>
<tr>
<td>Engage in the learning process</td>
</tr>
<tr>
<td>Work with other students on class projects</td>
</tr>
<tr>
<td>Participate in group activities</td>
</tr>
</tbody>
</table>

Source: “Student Study 2016” [infographic], EDUCAUSE.
Making the Case: Technology-Enabled Student Success

Michael Crow, President, Arizona State University

These statements were a reinforcement of his thoughts from a 2012 interview, in which he discussed the use of analytics: “I think the number-one thing we need to do is to focus on our own performance and the need to enhance student success. There are no more excuses. If you use these analytical tools, you will know where you are, you will know what you’re doing, you will know if what you are doing is working or not, and therefore you will know whether or not you need to be doing new things customized to fit your particular school or your particular demographic to be successful. We are underutilizing these tools.”

Notes

A SU President Michael Crow has been adamant about the ways technology innovation, integrated platforms, and analytics can contribute to student success. In an interview in 2016, he talked about what he was seeing in higher education, including “all of this hesitancy about the integrated, aggregated tools—both software and hardware—that we now have available to us.” He added: “These tools have moved so far forward that they are now unbelievably powerful in changing student outcomes. They can extend. They can expand. They can enhance. They can individualize. They can do all these things that even a few years ago they couldn’t do. You hear people saying: ‘It’s too hard. It’s too expensive. We can’t do that.’ The fact is that they don’t want to do that—it’s all excuses. We need to get about the business of integrating technology-based learning platforms as enhancements of our faculty and enhancements of our instructional environment.”

Just as information security risks are strategic and institution-wide, so are the solutions. EDUCAUSE research breaks down where responsibility for information security practices lies (see figure 2). No doubt, central IT bears the lion’s share of responsibility, but not all of it. And in a risk profile in which

Figure 2. Responsibility for Information Security Practices

<table>
<thead>
<tr>
<th>Practice</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data privacy</td>
<td>0%</td>
</tr>
<tr>
<td>Information security compliance</td>
<td>0%</td>
</tr>
<tr>
<td>Information security risk management</td>
<td>0%</td>
</tr>
<tr>
<td>Training and awareness</td>
<td>0%</td>
</tr>
<tr>
<td>Data security</td>
<td>0%</td>
</tr>
<tr>
<td>Information security policy development</td>
<td>0%</td>
</tr>
<tr>
<td>Configuration management</td>
<td>0%</td>
</tr>
<tr>
<td>Incident management</td>
<td>0%</td>
</tr>
<tr>
<td>Security software procurement</td>
<td>0%</td>
</tr>
<tr>
<td>Identity management</td>
<td>0%</td>
</tr>
<tr>
<td>Monitoring</td>
<td>0%</td>
</tr>
<tr>
<td>Network security</td>
<td>0%</td>
</tr>
</tbody>
</table>


student success because it is our mission, but technology-enabled student success programs could also generate net revenue averaging $1 million annually per institution (after factoring in the cost to educate the additional students retained). During difficult financial periods, helping students achieve their dreams while also generating revenue makes the strongest of all cases for strategic IT.

The best stories we have to tell about the strategic nature of higher education information technology are these powerful narratives about proven results and the future promise of technology to make a positive measureable difference in priority areas across our institutions. Of course, there’s an altogether opposite way of underscoring the strategic nature of technology: acknowledging the degree to which an IT failure or information security incident could imperil an institution’s reputation and finances. This is, naturally, why information security has easily earned the #1 spot in the EDUCAUSE Top 10 IT Issues list for the last three years. The risks are strategic and intense, and they will surely grow in the years ahead given weaponized artificial intelligence, video “deepfakes,” and “the coming quantum computing apocalypse.”

Notes
Making the Case: Information Security
Cheryl Washington, Chief Information Security Officer, University of California, Davis

Data is an institutional asset. Similar to financial assets, data can produce value for an institution or create a positive return, such as improving student success. Information security is an institution-wide challenge, and the IT organization alone cannot effectively protect the entire campus. Because of this interdependence, IT leaders must form alliances with other stakeholders to identify data that has strategic value to the institution and ensure that this data is protected and made available to decision makers when it is needed.

As at most other institutions, at the University of California, Davis, information security is a shared responsibility. Data is amassed, used, and managed by different stakeholders throughout the university. The IT organization clearly plays an important role in protecting the institution's information assets, but it depends on others. For example, vendors present security risks that require vigilance from the procurement office, and training across all campus stakeholders is necessary—not just in the IT or any other single unit. We work at an institution-wide, strategic level to meet the information security needs of our large and diverse campus. The challenge becomes manageable only when we operate in this way and only when the IT organization is viewed as a strategic partner that works directly with stakeholders throughout the lifecycle of a project or service.

Barriers
Getting to the Table
For those of us who work every day to strengthen higher education through the appropriate use of technology, the strategic nature of technology is not in doubt. Certain institutions not only have invested in strategic technology but have built it into the vision of the institution. In some cases, explicit “digital transformation” initiatives are accelerating the investment and the results; in other cases, strong connections across the C-suite or with the campus president or chancellor are making the difference.

Certainly, CIOs can lead effectively from anywhere in an institution; conversely, a CIO can take a seat at the CEO's table and contribute little. However, it's reasonable to ask whether much has changed in the last decade or so. And in fact, the place settings at the strategic table have not changed a great deal. According to the latest EDUCAUSE Core Data Service (CDS) data (2016), 32 percent of senior IT leaders report to the chancellor/president/CEO, hardly changing from 30 percent in 2003. When we look at the percentage of senior IT leaders who sit on the cabinet—arguably the most relevant, important “table” at which to have a seat—the situation is slightly better. In 2016, 55 percent had a place on the cabinet, up from 44 percent in 2003 (but decreasing from 57 percent two years before).21

The case for having the IT leader sit on the CEO's cabinet is a strong one. The 2016 EDUCAUSE IT workforce study tells us that when CIOs serve on the cabinet, they are far more likely to discuss the broader IT implications with executives and to shape institutional strategic directions, including those academic directions for which technology offers such promise. Gartner research notes the disconnection that results when nearly 60 percent of higher education CIOs “expect digital transformation to have a major impact on the institution business model within 10 years” and yet “only 35% have a seat at the executive table.” Gartner analyst Jan-Martin Lowendahl sees it as critical that presidents' cabinets include CIOs and that digital strategy be incorporated into institutional strategic planning, rather than exist as a separate plan or strategy: “It boils down to two
For nineteen years, I led the IT organization that served (and still serves) Hawai‘i's sole “R1” research university (University of Hawai‘i at Mānoa) and our unique University of Hawai‘i (UH) system comprising all public community colleges and universities in the state. Along the way, I had formal reporting lines to seven different individuals including heads of administration, finance, and academics and also CEOs. During that period, we had four heads of the UH System and seven heads of UH Mānoa.

As a CIO, I was in many discussions in which we debated and bemoaned our reporting lines and cabinet status. I’d offer three thoughts for reflection:

1. **Learn what you can where you are.** As one example, I learned about planning and institutional research when I reported to the senior administrator who led those areas. And I learned more about budget, procurement, HR, and financial management sitting in the room with those leaders under a chief administration and finance officer. All that I learned along the way served me well as my “rooms” shifted over time.

2. **As Aaron Burr observed (in the Broadway musical Hamilton), try to figure out how to be in “the room where it happens.”** Even if you are not a regular in “the room,” you can position yourself for access when appropriate or needed: when there are major discussions of issues that information technology impacts most intensely. Your (non-CEO) boss can get you there.

3. **Depending on your institution and where you are in your career, you may get “in the room” by virtue of your position (as defined by your predecessor) or by virtue of what you have yourself accomplished for your institution. You are more likely to get there if you can demonstrate your own strategic value and that of information technology to multiple aspects of your institutional mission.** For me, that meant becoming active across all of teaching & learning, research, administration, and community engagement.

   Remember that no institutional structure is immutable; they evolve based on both circumstances and people. Your path won’t be exactly like mine. As it happens, I’m now serving as that fifth head of the UH System and eighth head of UH Mānoa.

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**Making the Case:**

**Sitting at the Table or Being in the Room?**

David Lassner, President, University of Hawai‘i System, and Interim Chancellor, University of Hawai‘i at Mānoa

No One to Blame but Ourselves

It’s natural to look to CEOs to ensure that technology leadership is strategically placed in an institution, but IT leaders also need to look to themselves and do everything they can to be the kind of partner C-suite colleagues and presidents seek out for strategic insight. The #3 issue in the EDUCAUSE 2018 Top 10 IT Issues list is *Institution-wide IT strategy,* focusing on “repositioning or reinforcing the role of IT leadership as an integral strategic partner of institutional leadership in achieving institutional mission.”

Now is a good time to consider the degree to which our IT organizations are fully primed for this kind of institution-wide strategic capability.

Michael Kubit, vice president for IT and CIO at Penn State University, acknowledges that some legacy thinking may exist within IT departments. “Many IT leaders are too focused on technology and not enough on the core business of the college or university they serve,” he maintains. “As IT leaders, we need to help executive leadership and governing boards better understand the strategic value of IT as it relates to our institutions. IT organizations should be strategically pivoting from a culture focused on providing services to one of enabling and empowering the use of technology. If IT is perceived as a utility, we have no one to blame but ourselves.” Similarly, Joshua Singletary, CTO at Albany College of Pharmacy and Health Sciences, refactors the utility-to-strategic asset transition as a move from a utility-minded gatekeeper to a genuine partner. Sue Workman, CIO at Case Western Reserve, identifies the capacities required of the successful contemporary CIO, insisting that “talents not thought about—leadership, organizational management, business analysis, financial management, marketing, communication, change management—can be crucial throughout the campus. The CIO is no longer the geek-pooibah, rather the CIO is a thinker and doer that helps lead innovation and business management.” Acknowledging the IT shift from utility to strategic asset, she stresses the criticality of collaboration: “A
Making the Case: Collaboration
Bridget Burns, Executive Director, University Innovation Alliance

Launched in 2014, the University Innovation Alliance (UIA) is a group of eleven of the nation's largest public research universities committed to developing and scaling innovative solutions that help students of all socioeconomic backgrounds succeed and earn a high-quality degree.

When it comes to scaling student success initiatives, we have found that the formula for success is: Leadership + Change Management (teamwork) + Technology. We simply cannot meet the educational needs of America's future without technology. IT professionals play an essential role in the successful design, integration, and implementation of the complex technology solutions powering the engine of our work.

Most importantly, IT leaders have a critical role to play not only in identifying the right tools and approaches to bring important interventions to scale but also in supporting the thoughtful change management required. IT professionals also identify where and how technology can help with scale, and they ultimately ensure that institutional initiatives reach as many students as possible.

For example, inspired by its collaboration with UIA peers, the University of California at Riverside (UC Riverside) recently scaled its use of predictive analytics to give all university advisors access to real-time, precise data to inform how to support students throughout their academic journey. At the outset, UC Riverside took a thoughtful approach to building trust and demand for the initiative by starting with engaging key institutional stakeholders. To start, UC Riverside assembled a multidisciplinary team that included IT, institutional research, and student affairs staff, as well as faculty and advisors, to explore how the university would design and leverage predictive analytics to improve student success. After building a model for data use, and testing it with advisors, UC Riverside selected technology partner Civitas Learning to scale its homegrown approach. UC Riverside is rolling out its new system in the fall of 2018.

The UC Riverside project reveals three lessons for collaborating to integrate information technology into critical student success initiatives:

1. Involve IT professionals early to build the right support.
2. It’s not just technical. Don’t overlook change management.
3. Lean on the IT organization to engage the end user.
Decade ago, the job of a CIO was to make decisions about what technology to use and then operate it. There was much control over what was implemented and when. That is no longer the case today. Users have much control over their own technology. Collaboration is the key, and the CIO has to be a collaborator and leader, and a partner to other executives, and empower the university via technology.25

Undoubtedly, IT organizations would benefit from giving more attention to collaboration capabilities. Several of the key digital capability index scores in the EDUCAUSE CDS survey show, for example, that IT governance competencies lag behind others (see figure 3). EDUCAUSE research also demonstrates that institutions with formal IT governance bodies in place function at a higher strategic level—participating more often in strategic planning and policy-making, enjoying support from leadership, and involving others in decision making.26

In addition to evidence suggesting that there is room for improvement in structural collaboration (IT governance), EDUCAUSE research also finds evidence of opportunities for developing more capacity for collaboration at the individual level. For example, higher education CIOs indicate that they recognize the high importance of their ability to effectively manage relationships within their institution, influence others, negotiate, and understand non-IT areas; however, there is a gap between their assessment of this importance and their own proficiency (see figure 4). And it’s not just senior technology leaders: this same dynamic appears at other levels across the IT organization. For example, we see gaps between “importance” and “proficiency” not only for CIOs but also for non-CIO managers and non-managers when it comes to the “ability to manage relationships within institution” and to “understand non-IT business processes/operations.”27

When information technology is understood to be a strategic asset and understands itself this way, the focus is no longer on just the technology (e.g., the network) and its performance (e.g., 99.9% uptime) but now is also on the relationships, people, and processes involved in technology implementation and use. This latter layer is clearly apparent from the digital capability indexes that EDUCAUSE has developed and incorporated into the CDS survey. For key areas (analytics; e-learning;...
information security; IT governance, risk, and compliance; IT service management), we’ve worked with campus experts to determine the high-level domain areas that define success and have developed questions to help campuses benchmark their maturity in these areas. No surprise: the vast majority of success domains are not essentially technological. When it comes to analytics, for example, only one of the six domains (technical infrastructure) is explicitly technology-focused. A second is data-focused (data efficacy). The rest all fall squarely into the category of people and processes: decision-making culture; IR involvement; policies; and investments/resources (see figure 5). The same dynamic holds true for other capability indexes as well.

This point hit home for me most dramatically at the Top 10 IT Issues session at the 2017 EDUCAUSE Annual Conference when someone in the audience observed that what’s not in the top 10 lists could be every bit as important as what is and asked: “So, what’s not on the top 10 list for 2018?” Without missing a beat, one of our presenters answered: “technology.” The audience looked at the top 10 list and agreed, maybe a bit stunned by the insight. When technology adds strategic institutional value, the technologies themselves fall into the background, and the people and processes and relationships involved become the thing that matters most.

The strategic nature of technology solutions has made implementations significantly more complicated and challenging. Take, for example, the deployment of technology-assisted advising systems on campus to improve student success. Recognized as a strategic

Figure 5. Analytics: Digital Capabilities Index

asset with the potential to improve enrollment, student satisfaction, and retention/graduation rates, these projects can't be handled in an old-school way. Because these efforts advance institutional priorities, any number of areas need to be involved in implementation: the IT organization, advising, student affairs, the registrar’s office, academic affairs, and many more. In fact, as part of our work to advance integrated planning and advising for student success, EDUCAUSE has developed implementation guides to help colleges and universities deploying these systems, and we’ve tracked the broad range of stakeholders typically involved in these projects (see figure 6).10

Findings like these across institutional activities have profound implications for information technology and make it clear how far information technology has come in higher education from being a “silently awesome” utility. For information technology to be best positioned for success in this kind of strategic, interdependent, and collaborative landscape, senior campus leaders must ensure the strategic placement of the IT leader on the cabinet, but in addition, IT leaders must ensure that the IT organization is positioned to be effective, and even indispensable, for working in a collaborative context.

**Strategic IT: Already Here?**

It may well be that I end up at this point humming the same tune as Glick in 2001 or Wheeler and Voss in 2010. Together, we make up a chorus that acknowledges the strategic value of information technology, sizes up the distance to go to reach this broad recognition, and hopes for a more strategic future.

However, I agree with Voss’s statement in 2014: “Allowing these discussions to continue only within the IT community—among CIOs sharing horror stories at conference forums and in articles, op-eds, and blogs—also will not get the job done. We’ve been discussing this topic in various forums for as long as I was a CIO (nearly a decade) and, I’m pretty sure, for a decade before that (if not longer).”10 We will know we have arrived at a more promising reprise of the familiar tune only when we are having this conversation about strategic IT with those outside of the IT community. Voss suggested collaboration and shared discussion across higher education associations.

There is reason to be optimistic. The year 2018 marked the fifth annual Enterprise IT Summit partnership between EDUCAUSE and NACUBO (National Association of College and University Business Officers), bringing these C-suite professionals and their staff together. The 2018 summit also added AIR (Association for Institutional Research) to the partnership. The *American College President Study* 2017, produced by ACE (American Council on Education), clearly advises presidents to pay more attention to technology and asserts that those presidents and boards who “get IT” may very well be those presiding over the institutions that will be most successful in the coming decades.10 Meanwhile, the 2017 *Statement on Innovation in Higher Education*, issued by the AGB (Association of Governing Boards of Universities and Colleges), is both expansive and clear:

Successful innovation demands the governing board's attention to the strategic role of technology. Innovation requires adequate resources, but that is not always enough. Because technology is a foundational part of virtually every innovative strategy, it is crucial that technology is recognized and treated as a strategic asset, not a mere utility to be paid for, turned on, and forgotten about. Boards should ensure that campus technology professionals are thoroughly involved in those projects that depend on technology for their success, including the planning stage. The president needs to be certain that the institution's commitment to technology is well funded and staffed; however, presidents must also consider the strategic placement of technology within the organization. It will prove difficult, for example, for technology to serve as a strategic asset for innovation if the CIO is not at the table when key decisions are made at the cabinet level.11

Most recently, the *Chronicle of Higher Education* is publishing *Securing the...*
As my team has been working with the University of St. Thomas community to complete a campus ERP upgrade, I have been reminded of the fact that these huge initiatives are 90 percent about people and 10 percent about technology (and it's quite possible that I have overestimated the technology part).

The same is true for digital transformation initiatives. The goal is to become a nimbler organization that can respond rapidly to meet the ever-changing expectations of an internet-powered generation while maximizing profitability and enhancing competitiveness. But how do you go about the hard work of building this kind of organizational adaptability?

The answer is collaboration and empowerment. To this end, the business strategist Dion Hinchcliffe calls for organizations with “more decentralized yet highly engaged entities like empowered groups of change agents.” After all, the only way to really hear what your customers are asking for is to involve people from every team across the campus. Together, these groups will be able to tell you the full story of the actual customer experience—from the times when things get most congested to the most frustrating features of a given solution. Moreover, the only way you will be able to respond quickly in addressing these issues is to empower cross-functional teams to work together on implementing new solutions right away.

Done correctly, these new solutions will power new and better customer experiences, increase your competitiveness and profitability, and demonstrate organizational agility.

Finally, while agility is important, don’t forget that just as in ERP upgrades, the core information technology—“the plumbing”—remains critical to digital transformation.

Note
Digital Future: What College Leaders Need to Know about the Changing Role of the CIO, which makes the case for strategic IT as well, finding that “a growing number of college presidents and boards are realizing the importance of including information-technology leaders” in strategic planning discussions.¹³

There is still as much work to be done as there is to crow about. But I do not believe that in 2018 we are simply humming the same tune or repeating the same conversation from years past. Rather, I believe the situation is more akin to a version of William Gibson’s comment about the future: “Strategic IT is already here, it’s just not very evenly distributed.” To advance far broader recognition of the strategic value of information technology, EDUCAUSE has dedicated one of our three strategic priorities to Expanded Partnerships and Collaboration, including our stated commitment to “vigorously and comprehensively promote stronger, more collaborative relationships between IT leaders and their institutions’ senior academic leaders and other C-suite executives.”¹⁴

Perhaps our expectations simply need recalibration. The 2001 invocation of the “inflection point” metaphor suggests that a movement from a utility-focused to a strategic-focused mindset will amount to a sudden and productive change in direction, to a dramatic new trajectory brought on by a confluence of circumstances. On the other hand, maybe the realization of strategic IT in meaningful ways across colleges and universities is happening in subtler ways. Speaking at the 2018 EDUCAUSE Enterprise IT Summit, Scott Jaschik, Inside Higher Ed editor and co-founder, pointed to this more nuanced possibility when he observed: “I’ve been going to the EDUCAUSE annual conferences for a long time. I don’t know when it happened, but at some point in time the focus turned from hardware and technology to education. This was an important game-changer.”¹⁵

Our progress may seem confoundingly slow, and it may be difficult to track. But at some point I’m confident that we will look around from wherever we are and realize we have already arrived.

Notes
3. Mitch Davis, personal conversation with the author.
12. For example, our 2018 trend watch data suggests that 40 percent of institutions are planning institution-wide deployment of augmented and virtual reality, which holds significant potential for engaged, experiential learning (“EDUCAUSE 2018 Strategic Technologies: Data Table”), See also Kristi DePaul, “VR and AR: Pioneering Technologies for 21st-Century Learning,” EDUCAUSE Review, May 17, 2018.
18. See Donna M. Desrochers and Richard L. Staisloff, “Technology-enabled Advising and the Creation of Sustainable Innovation: Early Learnings from iPASS,” rpk GROUP, n.d. [accessed August 31, 2018]. Not included in this figure were additional costs incurred to put those initiatives in place. EDUCAUSE engaged rpk GROUP to develop a Return on Investment Toolkit to make it easy for institutions to predict


21. EDUCAUSE Core Data Service (CDS) data, 2003–2016. See the EDUCAUSE CDS website and portal online.


26. Joanna Lyn Grama and Leslie Pearlman, Digital Capabilities in Higher Education, 2016: IT Governance, Risk, and Compliance, ECAR research report (Louisville, CO: EDUCAUSE, 2017). For IT leaders who want to enhance their IT governance, the EDUCAUSE IT Governance, Risk, and Compliance program provides resources, including a toolkit, to explore IT governance concepts, benefits, and design strategies for building an IT governance framework.


28. A recent joint study by EDUCAUSE, NASPA, and AIR on the use of data and analytics for student success shows, at a glance, the same interdependencies between IT, student affairs, and institutional research staff. See Amelia Parnell, Darlena Jones, Alexis Wesaw, and D. Christopher Brooks, Institutions’ Use of Data and Analytics for Student Success: Results from a National Landscape Analysis (2018), figure 8 (p. 15).


33. EDUCAUSE 2017–2021 Strategic Priorities.


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For a comprehensive list of upcoming events, please visit events.educause.edu/event-finder
2019 Learning Events

**JUN 2–7**
Leading Change Institute
Washington, D.C.

**JUL 21–25**
Leadership Program
Management Program
Learning Technology Leadership Program
Senior Directors Program
Salt Lake City, UT

**OCT 14–17**
EDUCAUSE Annual Conference
Chicago, IL

**ONGOING 60+**
Webinars, Courses, Focus Sessions
Online

In 2002, I moved to academia after a career in the engineering industry. One of the questions I was asked in my interviews at the college was whether I could teach online. I had taught via distance learning in a fairly loose model, working with engineers and support staff across the globe in my role as a technical communications manager. To say I could teach online was a bit of a stretch, but I was not one to shy away from a challenge, and frankly, I really wanted this job.

I got the job. In those first semesters of my new position teaching English, the online student services we offered were growing, and we were trying to keep up with the demands of our students. In the early years of our distance learning initiatives, we instituted a cross-functional team that worked on streamlining processes and extending assistance to our online students, at a time when there were few out-of-house alternatives. We focused extensively on what our students needed, and we adjusted where we could and made workarounds wherever we could not change a process or policy. Now, sixteen years later, how we support online students has changed dramatically—mostly because we have continued to seek solutions that help our students succeed in their courses and obtain their career objectives.

As of 2016, over 6 million students are taking online courses each year, and over two-thirds of those courses are at public institutions.1 The numbers are stabilizing, after a fairly sharp rise before 2016. Part of the reason for the stabilization is that learning management systems and support structures have solidified and more colleges and universities have joined the online-offering arena. Online classes range from fairly independent study courses to robust, interactive courses, and from completely asynchronous courses to courses with some synchronous components. Some institutions have fully embraced online learning as another modality, whereas others have determined that this path does not meet their mission. While many colleges and universities are offering online student services to support their online learners, the types and levels of support vary widely. Accrediting bodies have been concerned with student services for online students for some time, and a very simple tenet to follow is that whatever student services are offered for on-campus students should be offered in an equitable fashion for online students. While this tenet may seem simple, its implementation can be complex and involved.

What?
What services are needed to support online learners? When offering online courses, higher education institutions should consider their students and how to best maximize the services already in place. What support is there for students to apply and register for classes on campus? Are there any variances for students who are not on campus? Once students are in classes, what technical support is available? Is there a help desk? Tutors? Computer support? Any service that students have available to them on campus should have an online equivalent. This may feel like an overwhelming, even Herculean, task. But as institutions review what they have in place, they can focus on the times and days that are available to support students and then review any obvious gaps. Not surprisingly, online students favor flexibility. Therefore, expecting online students to access student services only on Monday through Friday, and from 8 a.m. to 5 p.m., is unrealistic. Staffing a comprehensive help desk is expensive and likely unrealistic, and even if some extended hours are offered, it is unlikely that an institution can guess which hours and times will be the highest volume. Much of the need for student access depends on how faculty set up their online courses. As an example, if the bulk of faculty who teach online have their class assignments due Sunday night at midnight, there will be a high demand for student support on Sunday evenings after 7 p.m. Very few institutions have established consistent due dates across classes for when assignments must be completed. While this type of flexibility is normal in traditional on-campus classes, it complicates the task of anticipating when online learners will need help.

Where?
Where should these services be housed? Perhaps one of the most difficult aspects of determining where to offer online services can be determining the need (as noted above), but a second concern is understanding what can be most effectively handled in-house and what would be best supplied by an outside company. Those who provide student services on campus may have definitive ideas about how to provide services to those students who may not ever set foot on the physical campus. It is important to get this input as decisions are made; however, understanding online student learning patterns is also critical. Some staff may want to shift hours

Implementing student services for online students involves answering the basic, but nonetheless complex, questions of what, where, who, when, how, and why.
and see if they can provide additional services at different times. Technical staff or a student help desk that can assist with a broad range of issues may be the most useful in this regard. In other areas, such as tutoring, offering 24x7, all day, every day, access to subject-matter assistance may bring value to all students, including those who are not in online classes. Companies that offer tutoring services often employ tutoring professionals who live across the globe, which allows for the ability to offer assistance at any time. One of the best aspects of online learning is that students can learn at any time, which often means late at night or on the weekends. If institutions can provide subject-matter assistance at any time or any place, then student learning is not stalled when guidance is needed. Although providing this expertise in-house can be challenging, various global companies offer assistance in numerous subjects and across a range of available times.

**Who?**

Who should provide these services? The marketplace of online services has exploded in the past few years, including text-to-speech systems, tutoring services, help desks, intrusive advising, and more. Criteria to consider when reviewing the multitude of companies and services available will depend on the type of institution, the breadth of online offerings, and the dollars available to invest in external systems. Institutions should review the online courses offered and where students seem to have need and then work on delivering the solutions that meet those needs. If there are low-cost/no-cost solutions (e.g., online writing labs that provide a resource site), reviewing the need for online writing feedback services, such as paper review or plagiarism checkers, can be the next step. Text-to-speech software is especially helpful for those learners who may have reading challenges or for whom English is not their first language. Additionally, text-to-speech software tools generally have a recording component, allowing students to transfer print to aural modality, which can aid in processing and retention for some learners. Advising systems often function through the use of data and intelligent agents, and once set up, these systems require little personal intervention to send messages and follow up with students. Additional personal interventions can be handled during traditional work hours.

**When?**

When should institutions offer services for online students? The answer to this question should be obvious. If an institution is offering online classes, it should be providing student services to those online students. If an institution chooses not to provide services to online students, student retention and persistence will be negatively impacted. Start small if needed, but institutions should invest time and resources into the services that are necessary to support online students.

**How?**

How should institutions provide services? There is no cookie-cutter approach to serving students, whether those students are online or on campus. Institutions follow best practices in ways that make sense for them, and they make modifications as needed to support their own programs, departments, and student population. For example, if an institution has a high population of English learners, then providing additional support in that area makes sense because it will benefit those students. Using a text-to-speech reader, or a language-conversion tool, will be a useful service to these students, both on and off campus. To find best practices for online student services, look to organizations like EDUCAUSE or other nonprofits, to businesses that specialize in IT services for education, and to publications such as EDUCAUSE Review, The Chronicle of Higher Education, and Inside Higher Ed.

**Why?**

Why support online learners? This is the easiest of all the questions to answer. Student success is why we do what we do. Supporting students in ways that benefit their learning and help them achieve mastery is the lynchpin for any service; helping students navigate through the higher education landscape and complete their programs of study is the key for ancillary student services. Failing forward is key. Do not be afraid to try new approaches to online student services, and do not overanalyze situations to the point of paralysis. Identify needs, review costs, make a good investment, and adapt as needed.

**Note**


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Managing the Cultural Record in the Information Warfare Era

Several rapidly emerging lines of technology development and exploitation are converging, and they are going to change the world in the next decade. They will have massive social and political impact; indeed, we are already far down that path, as I’ll discuss shortly. These trajectories will create new complexities for a wide range of scholarly investigations. They will challenge us to rethink the way we define and teach information literacy. They will demand that memory institutions such as libraries and archives reconsider the documentation and contextualization of the cultural record, and they may even drive the creation of new public infrastructure supported by memory institutions and responsible content creators and distributors.

Fully exploring these developments requires a book (at least), but I will try to give a very high-level sketch here, with some limited pointers to additional information (much more can be found with a little Googling). My hope is that the reader will be able to see the broad trends.

The first development is the ability to fabricate audio and video evidence. Software that can do this is becoming readily available and doesn’t require extraordinary computational resources. If you want to produce a persuasive video of someone speaking any script you’d like and if that person has a reasonable amount of available recorded video, you can synthesize that video into the fabrication software. The obvious place for this is politics: pick your target politician, put words in his or her mouth, then package this into propaganda or attack ads as desired.

Fabrication is much more than talking heads, of course. In pornography markets, another popular application is “deepfakes,” where someone (a public figure or otherwise) is substituted into a starring role in a porn video (the term “deepfakes” is used both for the overall substitution technology and for the specific porn application). This is already happening, though the technology is as yet far from perfect. Beyond the obvious uses (e.g., advertising and propaganda), there are plentiful disturbing applications that remain unexplored, particularly when these can be introduced into authoritative contexts. Imagine, for example, being able to source fabrications such as police body-camera footage, CATV surveillance, or drone/satellite reconnaissance feeds. The nature of evidence is changing quickly.

From a purely technological perspective, machine learning is being harnessed in fascinating ways that feed the ability to fabricate. Space does not allow me to explore generative adversarial networks (GANs) in any detail, but basically the idea is that one system creates fakes, another system identifies the fakes, and then the two are connected so that both can improve their game iteratively as they interact. GANs create a continuing “arms race” between falsifiers and falsification-detection systems; each of these systems can be unleashed on the world independently. It remains to be seen whether the advantage rests with the offense or the defense.

Part of the social challenge here is that people seem to be wired to believe their eyes and ears (i.e., “seeing is believing”). Having encountered advertising, propaganda, and fiction, they are experienced with, and hence have some level of defensive skepticism about, the written word. Even though there is a century of experience with photo manipulation, video in particular still seems to be deeply persuasive, and we don’t understand how the potential for personalized fabrication in the current environment, as opposed to a “publication” or “broadcast” dissemination, may change the balances. Fixing this is going to have deep implications for how we think about information literacy going forward. While there’s a great deal to be learned from our experiences over the past century, what’s different today is the scale, the ready availability of these tools to interested individuals (rather than nation-states), and the move into audio/video contexts.

In addition, a separate and important set of issues concerns how fabricated material broadly (whether old-fashioned text materials or new digital fabrications) is introduced to the public sphere and subsequently promoted and given visibility and credibility (e.g., through manipulating social media system mechanisms or by subverting what are viewed as “official” channels). Although I will not consider these issues here, tools, opportunities, and strategies in this sphere could be considered a second driving development.

The third development thread is a bit more speculative. Anyone who has followed security breaches and penetrations over the past few years knows that the track record of protecting data aggregations from exfiltration and subsequent disclosure or exploitation is very poor. And there are many examples of attackers that have maintained a presence in organizational networks and systems over long periods of time once they have succeeded in an initial penetration. While a tremendous amount of data has been stolen, we hear very little about data that has been compromised or altered, particularly in a low-key way. I believe that in the long term, compromise is going to be much more damaging and destabilizing than disclosure or exfiltration.

As we have moved from highly distributed preservation and storage of physical materials (i.e., libraries) to centralized digital...
resources (i.e., major news media sources, scholarly journals, or almost anything else in the digital world), we are facing a scenario in which a very small number of points of potential compromise exist for a great deal of our scholarly and cultural record. This new centralized world offers few checks, tripwires, or other mechanisms to prevent an attacker from rewriting pieces of the scholarly or cultural record (including legal or government records) once the central server is compromised. I want to explicitly note here the difference between the act of quietly rewriting the record and enjoying the results of the rewrites that are accepted as truth and that of deliberately destroying the confidence of the public (including the scholarly community) by creating compromise, confusion, and ambiguity to suggest that the record cannot be trusted. Both acts are very dangerous and damaging, but they serve different objectives. While rewriting or populating the news with fake audio-visual material is likely to have the biggest impact on the public at large, we need to think through the potential impact of a subtly corrupted scientific record and the issue of how we will develop a generation of scholars who can question, recognize, and deal with this sort of intentional corruption.

But putting the primary burden for this task on higher education is insane. Information literacy needs to start in elementary school, and students must be consistently and continuously engaged as they mature from there. New challenges in how we identify and contextualize various kinds of fabrications in libraries, archives, and museums—and in the classroom and in the learning experiences of students more broadly—will continue to arise. We must collect these materials: they will be essential in the future for understanding the present, if for no other reason than that they play an important role in shaping reality for today’s broad public; their personalization will be an immense challenge.

Obviously, we need greater capability in digital forensic technologies to detect computer-generated fabrications. The Defense Advanced Research Projects Agency (DARPA) is making a substantial investment in this area. Simply claiming that we will develop machine learning systems to identify fakes is much too simple, however, and much too glib: humans need to be able to understand clues, and evidence, and to work in tandem with these machine-learning systems (much as, I think, the best medical image analysis will be done by machine-learning-based systems and human experts working together).

Actions can be taken to “harden” the system. Being able to prove that a digital object existed at a given time, and/or was captured at a specific time and place, and/or wasn’t altered since it was registered, is very valuable. There’s an active research area in terms of imaging devices that aim to “sign” captured imagery with GPS coordinates and timestamps, but this is a difficult problem to solve (e.g., GPS receivers can be easily spoofed).

Independent of the efforts to document the capture of materials in a trustworthy way, the cultural memory sector must step up to the challenges of contextualizing media once it is created and disseminated. Registries are fairly straightforward, at least technologically. It’s important to track chains of custody and provenance in ways that are transparent and secure. I want to distinguish such registry and subsequent provenance tracking carefully from third-party escrow preservation systems, like Portico, which deal with redundant custody of full-content copies; these are also critically important to the survival and resilience of content rather than just integrity. They can actually substitute for the original content holders under appropriate circumstances. Setting up and operating such preservation systems is a complex financial, legal, and contractual as well as technical undertaking; it’s also essential, and in many sectors beyond scholarly publishing, motivating content holders to participate has thus far been intractable.

All a registry system can do is provide testimony that shows, to a very high degree of confidence, that a digital object held by someone else has existed since a given time and has not been modified. Registry is a much simpler thing than preservation and can be used by third parties as well as the content holders. We don't have such systems today as part of broadly recognized public infrastructure for digital content.

A four-pronged approach to the new information warfare environment seems to be emerging. One prong is greatly improved forensics; this is a mostly technical challenge, and memory organizations will be mainly users, not developers, of these technologies. Documentation of provenance and chain of custody are already natural actions for memory organizations; the challenge here is to make this work more transparent and rigorous and to allow broad participation. Capture of materials, particularly in a world of highly targeted and not easily visible channels, will be a third challenge at both technical and intellectual levels (though we are seeing some help now from platform providers). Finally, contextualization of fakes or suspected fakes is perhaps the greatest challenge, and the one that is least amenable to technological solutions.

Notes
2. These issues have received a great deal of recent attention through explorations of developments such as the Russian manipulation of social media platforms in US elections and the UK Brexit referendum.
4. For example, see Matt Turek, “Media Forensics [MediFor],” U.S. Department of Defense website, sponsored by the Defense Advanced Research Projects Agency (DARPA), n.d.
6. Blockchain is very fashionable and getting a great deal of press; really what’s relevant here is the broader idea of distributed ledgers. See Hanna Halaburda, “Blockchain Revolution without the Blockchain?” Communications of the ACM 61, no. 7 (July 2018).

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I speak to many early-career professionals who conflate “career” with “employment,” and I advise them to broaden their view. Much of my career satisfaction and professional contribution came outside of my employment, as part of the professional community. I recently asked retired CIOs to identify valuable experiences they remembered from their careers. Robert Paterson offered a comment endorsed by other retired IT leaders: “Most valuable were the professional relationships made through organizations and conferences, the willingness of colleagues to share their knowledge base, and the joint support received from them.” We can have two, simultaneous career pathways: one as a staff member of the institution where we are employed and a second as a member of a large and vibrant professional community. There are times when a job can be unfulfilling, for any number of reasons, and during those moments our professional community can provide a terrific opportunity to contribute to the greater good.

Our careers involve a series of job roles, often in different organizations and on a variety of campuses. While the transitions can be difficult, the community can be constant and grounding. Our ability to navigate transitions contributes to success and feelings of contribution and value, especially when supported by a consistent community that sees, understands, and appreciates our value through several transitions.

As we follow our career pathways, we all work with many different teams. Richard Nelson, another retired IT leader, stated: “As I look into the rear-view mirror, every contact I made, either good or bad, was valuable to me and helped me grow as a person, as a leader, and as a problem solver.” As a member of a team, we see our good moments and bad moments reflected back to us. I like cycling, and so I like watching the Tour de France races, which last more than three weeks. Cyclists work collaboratively in a team, called a peloton, which may be likened to a murmuration of birds. There are good days and bad days, good weeks and bad weeks, shared together as a group, constantly in motion. The motion of the peloton is complex, at times seeming synchronous and with central control and at other times appearing to be free and random movement. Craig Reynolds has written that there are three rules to be followed by each bird in a murmuration (or, for that matter, by each cyclist in a peloton): stick with the group; proceed at group speed; and don’t bump into others (stay in your lane). Following these rules involves learning the group mores, the organizational culture, and the lanes of responsibility. Some action may not be your personal job, but it is up to you to discover and learn whose job it is and along the way develop organizational awareness and valued partnerships. The shared experience of the peloton provides strong group bonding and a truly memorable experience contributing to a transformative event.

These same descriptions form a good foundation for teamwork, especially on large and complex projects. IT professionals looking back at their careers often cite the milestone projects that provided the peloton experience. Often mentioned are ERP implementations, LMS implementations, major network shift projects, and email transitions. I now point out to early-career professionals that the major project they are working on may be something they do only a couple times in their entire career and that the experience, as well as the people they work with, will be memorable. Ron Cigna, retired CIO, offered: “I, literally, loved the people I worked with and had an extraordinary career because of them.” I encourage project team members to ask themselves: Are you doing the most you can possibly do with your peloton, your team? Don’t miss out on the long-lasting impact your work
contributes to the project and the lifelong partnerships that you will build. Purposeful actions are about helping the group succeed; what adds meaning to my career at this stage is knowing that I continue to help others in the group do their best.

Talking tech is one aspect of a communications portfolio that includes public speaking, published writing, and active listening. The actual tech subjects change over time, of course. At one time, our discussions included core dumps, checking for periods after column 80, and hierarchical database program specification blocks. Today I listened to an early-career team member present a solution involving encrypted JSON web tokens placed on a page in a widget. We are talking about what matters to us: solving technical problems, whatever the current tech happens to be. Our endless curiosity and desire to solve problems is a strong foundation that has to sustain us over our entire careers.

While some leaders say they hire the “best fit,” with the idea they can teach anything technical, I have found the reverse to work better for my organizations. We seek to hire the best technical talent and then develop the rest as part of our culture. One Merriam-Webster definition of the word culture is “attitudes, goals, values, and practices held in common” (back to our peloton). Our cultural attitudes, values, and practices change little over time and provide a strong foundation. An experienced leader can make a great contribution by communicating values and ethics—especially by sharing ethical decisions confronted over the course of a career and by leading explorations of values and ethical concerns with new technologies. Core values, like privacy, may stay the same over time, but they may also (simultaneously) be challenged in new ways. For example, experienced leaders can engage in ethical discussions around big data analytics, such as new initiatives in student social and learning data or in edge-device data in the growing internet of things (IoT) environment. Our experiences can shed light on unintended consequences and privacy issues.

When CIOs talk about the skills that CIOs need to bring to the leadership table, the list includes negotiation, persuasion, and influence. A long career in IT leadership also requires perseverance, resilience, and integrity. Retired CIOs or those late in their careers share stories of frustration and failures along the way. Much of the expressed frustration is connected to the ongoing and never-resolved gap between campus expectations for a quality technology experience and the resources (both funding and people) required to deliver solutions. The work is not easy and generally is not visible or understandable by many campus members. Still, we can find personal reward in cultivating perseverance and resilience and in knowing that we worked with integrity. Bruce Maas, retired CIO, states: “I pass along to others that the struggle is what shapes us.”

In addition, I believe that the abilities to suspend your disbelief and to nurture solutions over time are key. We have to believe that we can enable positive change, and we have to hold on to that belief to the very end of a career. Those of us in the last quarter of our careers have the advantage that we have experience with performing in a variety of situations. We can share those experiences with others and help them see the lasting impact of their work. And perhaps more importantly, we can share and contribute to EDUCAUSE and other professional organizations, creating lasting impact in our community. These are intentional leadership actions, and when we finish the final quarter of our career, we will remember these actions with satisfaction.

Note

Theresa Rowe (rowe@oakland.edu) is CIO at Oakland University and is the 2018 Editor of the Viewpoints column for EDUCAUSE Review.
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<td>69</td>
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<td>53</td>
</tr>
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<td>31</td>
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<td>21</td>
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<td>42</td>
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<td>37</td>
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<td>31, 55</td>
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