



# Reflections on Information Technology Leadership in Higher Education

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**E D U C A U S E**

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EDUCAUSE is a nonprofit association whose mission is to advance higher education by promoting the intelligent use of information technology.

The mission of the EDUCAUSE Center for Applied Research is to foster better decision making by conducting and disseminating research and analysis about the role and implications of information technology in higher education. ECAR will systematically address many of the challenges brought more sharply into focus by information technologies.

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## Preface

The EDUCAUSE Center for Applied Research (ECAR) produces research to promote effective decisions regarding the selection, development, deployment, management, socialization, and use of information technologies in higher education. ECAR research includes

- ◆ research bulletins—short summary analyses of key information technology (IT) issues;
- ◆ research studies—in-depth applied research on complex and consequential technologies and practices; and
- ◆ case studies—institution-specific reports designed to exemplify important themes, trends, and experiences in the management of IT investments and activities.

In its most recent research, ECAR has published a comprehensive gathering of information on IT leadership in higher education in *Information Technology Leadership in Higher Education: The Condition of the Community*.<sup>1</sup> It was undertaken in five phases, described below.

## Literature Review

A review of the relevant literature helped us define the study's major elements and create a working set of hypotheses.

## Analysis of Leadership Models and Survey Instruments

Leadership has been studied extensively for decades, and numerous models and survey instruments have been developed, tested, and used repeatedly. ECAR examined several survey instruments for general leadership, innovation, and evaluation of chief information officers (CIOs) in higher education, as well as the CIO surveys used in industry, and selected several for inclusion in our online survey.

## Online Survey

The EDUCAUSE staff sent an e-mail invitation with the online survey's Web address to 13,115 EDUCAUSE members, and 1,939 responded to the survey. Of these, 1,850 were from the United States or Canada and were used as the respondent base for *Information Technology Leadership in Higher Education: The Condition of the Community*.

## Telephone Interviews

Researchers conducted intensive telephone interviews with nearly 30 IT executives, directors, and managers who represent current or aspiring IT leaders in higher education.

## Case Studies

Researchers conducted this in-depth case study to complement the core study. We assume readers of this case study will also read the primary study, which provides a general context for the individual case study findings.

We undertook this “Reflections on Information Technology Leadership in Higher Education” case study to draw on higher education’s leadership experience and projections for this community’s future as discussed in a roundtable meeting. To delve into the topic of leadership from the perspective of those who lead, ECAR convened a group interview of prominent CIO leaders. All have received the CAUSE leadership award and are recognized by their institutions and their peers as industry, IT, and campus leaders. For their insights, time, and generous participation, ECAR owes a debt of gratitude to Ron Bleed (vice chancellor, information technologies, Maricopa Community College District), Jack McCredie (CIO and associate vice chancellor, information systems and technology, University of California, Berkeley), Martin Ringle (chief technology officer, Reed College), Mike Roberts (consultant, The Darwin Group), and David Smallen (vice president, information technology, Hamilton College).

## Introduction

We all carry with us images of leaders we have known or admired. Some are the great leaders of history—the men and women who have shaped and been shaped by wars, political triumphs, scientific discovery, or business success. Others are the leaders we meet every day in our communities, on our campuses, and in our organizations. We have also known

strong and capable managers who made critical contributions but weren’t recognized as leaders per se.

What makes an individual an effective leader? How is leadership in higher education different? Is leading IT different than leading other parts of the academy? These are the questions that a group of experienced higher education CIOs and other IT leaders convened to discuss with ECAR. The summary of that conversation provides us with insight into not only the attributes of an effective leader today but also where CIO leadership needs to go in the future.

The discussion was organized around the following topics:

- ◆ qualities of a leader,
- ◆ leading in higher education,
- ◆ recruiting a CIO,
- ◆ the next generation, and
- ◆ the future of technology and the CIO position.

## The Qualities of a Leader: Doing the Right Things Versus Doing Things Right

Why are some able to lead and others manage? What is the intrinsic difference between the two? This topic kicked off our conversation. Jack McCredie, CIO and associate vice chancellor of information systems and technology, University of California, Berkeley, described the important difference between the two. “You can look at business school curriculums and see that you can teach the skills—financial, budgeting, planning, people skills—that a good manager should have. Maybe the cute phrase that gets at the core of this is ‘doing the right things’ versus ‘doing things right.’ Management is about doing things right. Leadership is trying to get the vision and get a whole organization to do the right things. I think Peter Drucker said that. Maybe that is too trite, but I do believe there

is a real difference between management and leadership. Many times when people talk about it they blur those two.”

The group struggled at first to define why they were effective leaders. This was a by-product of both modesty and the topic’s complexity. The group concluded that leadership is difficult to define in part because of its intrinsic nature. In their opinions, strong leaders are not made from a singular set of skills, background, or experiences. As Martin Ringle, chief technology officer at Reed College, summarized, “One thing that has struck me about people that I have known to be leaders worthy of great admiration and respect is how different they are from one another, not how similar. If I look at leaders, I am very hard-pressed to find the common denominator shared by all.” Throughout the roundtable, however, a set of inherent traits common among confident and successful leaders emerged.

### **Determination**

Mike Roberts, consultant with The Darwin Group, believes every leader goes through a period of self-determination while moving toward the top. “You need to connect your own ambition with where you want to end up,” he stated. “There was a point where [every leader] had to say, ‘I want to be in the top rank, and here is how I am going to get there.’” As a Navy captain once described to him, “When you get within shouting distance of the top, those who make it are self-selected because the higher you go, the more you are expected to sacrifice for the organization.”

### **Willingness to Serve Organization over Self**

As personal commitment grows, so does the sense of institution. “At some point [I] realized that what this is about is the institution, not my job,” said David Smallen, vice president of information technology, Hamilton College.

“You realize there is something bigger than you, and that is what interests you. I have only been at one place. People in the career center always say you are going to have five jobs—so I have four more coming! I came to Hamilton interested in Hamilton ... but for me it was always about that institution.”

### **Optimism or Conviction**

Leaders also persevere. “When faced with challenges, [leaders] tend not to see the dark side of failure,” stated Ringle. “They tend to look at every challenge simply as an opportunity. When I have asked [leaders] what do you do when things look really awful and you are not sure what to do next, the answer I most often get is, ‘I don’t know if I have ever been in that position.’ There has always been an answer.”

Ringle attributed this persistence to a conviction, almost a “childlike enthusiasm that they are going to find a solution to every problem. There is no such thing as being constrained. Leaders may not know how to do it today, but they are going to know tomorrow. Everyone I know who has been very successful has been utterly fearless when it comes to the question of whether or not they will succeed.”

### **Improvisation**

Leaders use their conviction to adapt to evolving situations. Roberts defined it as “the confidence that comes from succeeding in difficult situations with unknown variables and so on. Good leaders carry around a couple of ‘Plan Bs,’” he explained. “If you ask them while getting patted on the back by the provost for a job well done if it turned out how they expected, more often than not they say, ‘Not on your life, but we did it.’” McCredie summed it up this way: “It is also the ability to determine what to do without complete information. You can’t calculate optimization. In leadership roles you never have enough

information. Somehow you have to figure out the right step that needs to happen.”

## Integrity

Leaders also temper their actions with ethics. “Looking around the room and knowing some of these gentlemen, I think there is a real ethical dimension to leadership, particularly in higher education,” stated Ron Bleed, vice chancellor of information technologies for the Maricopa Community College District. “You have to have something inside you that represents a very ethical person, so that people will follow and trust you. Leaders have a degree of high standards inside themselves so that people do want to follow them.”

## Suction or Force— Leading in Higher Education

As the discussion of leadership grew more specific to higher education, the group discussed some of the leadership challenges unique to higher education. They examined landmark decisions for the industry, such as the creation of the Internet and Internet2 and the decentralization of computing, and they looked for the leadership lessons in those events. As the discussion progressed, the group began to reflect on what makes a successful leader in higher education. Participants kept coming back to the ability to see the needs of the broader organization, understand the cultural context, and develop the skills required to build coalitions of followers as the central ingredients to leading in higher education.

For example, McCredie recalled that when he ran a central organization, the institution reached a point where it needed to move from a central paradigm into time-sharing. “No one told us to do it,” he remembered. “It arose from computer science departments and colleagues and smart people talking about it. Out of that came the vision for doing the next thing.”

But selling a new vision is not easy, especially in academia. Roberts explained, “One of the special characteristics of the jobs we hold is that being a CIO in a university is different. In the private sector or government there is so much order that if the word comes down you are going to hop on your left foot, people do it. In the university environment people would understand the order and then ask who the hell thinks we should hop on our left foot!” The group outlined several strategies to achieve their visions:

- ◆ Bleed advised “communication, personal communication, and communication in the context of your environment.” He recalled hiring a technically savvy veteran employee from Sun who could not adapt to the university culture. “At Sun, if Scott McNealy introduced something at 5:00 p.m. on Thursday, on Friday everyone did it. This person could not understand why the chancellor could not tell them to do it. He could never get the culture in that sense. You have to learn to flow with the culture.”
- ◆ Draw people in, or use—as Ringle described it—suction. “It’s real power, but it’s a different kind of power. It’s pull rather than push. It’s the ability to deliver your message as much by the way you listen as by what you say. You have to create the kind of suction that draws people along, rather than prods them in a certain direction. And if you can’t, you won’t be a good leader in higher education. The most striking examples of successful leaders in our profession are those who have a vision and can articulate it. People follow such leaders because they want to, not because they feel compelled to.”
- ◆ Practice management by indifference. Follow the path of least resistance. Smallen recalled a speech from several years ago, at the Educom conference in Atlanta, by the president of the University of Georgia, who described moving his organization forward by “navigating in corridors of in-

difference.” Smallen elaborated, “There are many ways to get to the end you are trying to achieve. In some cases, if you take what appears to be the most direct way, you will meet the most resistance because you will run into things that people think can’t change. There are many ways you can navigate so that people don’t feel as threatened, and ultimately you can get to the same end.”

The group also noted the added leadership dimensions as IT expands throughout the institution and, by necessity, becomes more tightly aligned with institutional priorities. “One example of how the top IT job has changed is how it has moved from being responsible for getting things done to being able to creatively find ways to use the capacity of the organization to support the mission,” stated Roberts. “Information technology has grown more tightly and more directly coupled. You are well thought of because you have connected what you do to what the university needs to have done to support its mission.”

This is particularly true as more CIOs sit on the president’s cabinet. “Fifteen years ago there were not many CIOs sitting on cabinets,” stated McCredie. “At the set of peer schools that I look at today, it is now 50 to 60 percent. That is a big change, and it requires a tremendous adjustment in people’s ability to take off the hat of the IT leader, sit at the table, look at the whole institution [level], and ask what is best for Hamilton or Berkeley.”

As a result, IT leaders must learn how to adapt their inherent leadership traits and styles to work within an institutional context. “The culture and the environment become more powerful,” stated Bleed. “You can’t fight it. You have to be true to yourself on the one hand, but you have to be aware of who you are working for. Adaptability and flexibility are very important.”

This gains special significance when IT leaders move to a new institution. “You could have been a great leader in one organization and

culture,” stated McCredie, “but if you don’t adapt to where you are, you are just going to fail.” Smallen explained, “Each institution is so different in how it operates. What you bring is a set of principles about how you operate, basic beliefs such as that people will want to do the right things. That is a fundamental principle you come with and that can be adapted to any kind of environment.”

Ringle elaborated: “If you want to get something done, you have to know the culture, its definitions, and its idioms. When you look at people that have spent time at many places, you often see people who have successfully transcended their environment. They can pick up the clues, they can learn the language of that environment very quickly, and they are successful.”

### **CIO Needed, Apply Here— What Do Institutions Look for in a CIO?**

This group of CIOs has had the experience of working for multiple institutions and also frequently serving as advisors to institutions hiring new CIOs. All felt that the CIO job is one of the most difficult administrative positions to recruit. “The phone rings several times a year and people ask me if I know anybody,” stated McCredie. “I always ask them, ‘What are you looking for?’ and I always get an answer back, ‘We are looking for a good CIO.’”

That is part of the challenge. Institutions can rarely articulate what they are looking for and then develop clear criteria to sift through the qualified candidates. “I have been working with a number of schools to help them search for a CIO,” stated Ringle. “There are few things as amusing as sitting with a board, senior officers, and faculty to tease out the criteria for what a proper CIO would be. Talk to them about a VP for student services or a chief financial officer and the opinions are zooming and you get some convergence. But when you talk to them about what they think a CIO should be, they are stymied.”

Interestingly, Ringle found the “utter cluelessness” so common that he asked himself the same question. “I couldn’t figure it out, either,” he said. “I got a long laundry list—articulate, politically savvy, energetic, personal enjoyment for technology, sharp problem solver, experienced. But when I tried to translate it into a tight set of qualifications, I could not get it down to an advertisement. All I got was ‘CIO needed, apply here.’”

The group then discussed what makes the CIO position so challenging to recruit. In part, the challenge arises from the position’s relative newness and the lingering mystery of technology. “It is the technology component—mastery of the technology for that institution. That is where the fog comes from,” stated Roberts. “Institutions can’t articulate what that means.” Smallen was a bit more cynical: “The reality that I have seen is most institutions have some problem to solve,” he said. “A position is usually filled as a result of what happened before. The organization is in chaos, shoveling the money out the window, and they need someone to build a strong organization. They will find someone good to do that and solve that problem. The question then becomes, can they go beyond that?”

But as Bleed and McCredie noted, this ties back to placing institution before self. “You need to come in with more than a single agenda,” Bleed stated. “Failure is often because someone comes in enthralled with or to solve one problem only. You lose other agenda items equally important to that college. So the specialization of the individual to that college sometimes gets in the way of success. You have to run a series of agendas—put in the high-speed network and still get the payroll checks out. You have to pay attention to all the agendas.” McCredie concurred: “[It is] seeing what is best for Hamilton [or your institution]—not what is best for you or what you are most interested in. You may have a couple of things you are interested in

that just don’t fit with where the institution is at the time that you don’t pursue. A good leader figures that out.”

Perhaps the challenge also reflects institutions’ ongoing search to understand technology’s role at their campuses. Some view technology as a source of competitive advantage and seek out an IT leader with the skills to transform the institution. Others see technology more as a utility and seek leaders with the skills to optimize the IT organization’s performance.

Neither view is wrong. The problems arise when an institution is uncertain of its view of technology or selects a CIO with a vision or skills that are not aligned with its needs and expectations. “It is hard for search committees to internalize that,” stated Roberts. “This cycle we want someone to mind the store; that cycle we want to redo everything. I think one thing that is unique to IT is that institutions tend to get into a roller coaster on technology. It extends to boards and presidents. The people who lead the school are a competitive bunch. So, someone will decide that being up on peers involves a new initiative in computing, and we need a CIO to drive it. So a search is done for a miracle worker. They seldom find the right person, so they are disillusioned, and then they look for someone who can mind the store.”

## **The Next Generation and the Role of Mentors**

Another issue facing IT leaders is the development of the next generation of leaders. “The longevity of all of us—we have blocked the career ladder for others,” stated Bleed. “We are all in our fifties and sixties, and we are keeping a lot of 40-year-olds waiting. Sometimes they leave us. There is a graying of our profession that is unhealthy. Equally unhealthy is a lack of diversity in our profession based on color and other dimensions.”

Another challenge is the job’s growing

complexity. “We have had a lot easier entrée than people today do,” stated Bleed. “I had the same start that everybody else had. I took two computer courses in college—the only two they had.” Roberts believes preparation today is more difficult. “The issues are more complex, and the IT environment is enormously more complex. In the 1970s, you got promoted or fired because you could or could not figure out how to get an IBM machine to run right. Today, there are at least a dozen sessions [at the EDUCAUSE annual conference] on network security. It is not only a big cluster of technical problems but it is a bigger cluster of sociological, political, and ethical problems.”

The expanding technical and managerial job dimensions make it harder for aspirants to identify a precise career path. Ringle, however, believes this imprecision is a strength. “People stumble into the career from all areas. Some come with faculty credentials, some without. They bring a richness and inventiveness to the enterprise. We are still wild and wooly. You have to look for people looking for the frontier. This is still one of the frontiers. This is exciting stuff. This is wooden ships, not ocean liners. If you are the kind of person that likes to explore in wooden ships, the job is for you. It is not as comfortable, but it is a lot more interesting.”

IT leadership expands across the institution, so the group advised aspiring leaders to gain experience beyond IT’s borders. Aspirants must first understand the institution itself. People who express an interest in IT leadership tend to be “young technical types,” stated Bleed. “So, the first thing they need to do is understand the institution. Get involved in committees and events and understand the institution. Broaden immediately. Don’t worry about SQL server. You are probably enough of a technical expert already.”

Another dimension is the academic enterprise. Teaching experience is not essential, but

it is helpful for communicating with faculty. “But it is not only the experience,” believes Smallen. “It is the interest. You have to find that part of you that is interested in the institution—the academic part. That is ‘our show,’ and the faculty can’t do ‘the show’ without us. At a place like Hamilton, we know that the faculty relation[ship] with students is what Hamilton is all about. Everything else makes that happen. I get excited by going to a classroom and seeing students in a cluster, working with each other and the faculty. I get excited about making that happen. I don’t think you necessarily have to have been a faculty member. But if you are not excited by ‘the show,’ then you are not going to be successful.”

McCredie, however, warned that making the job qualifications too complex will discourage many potential aspirants. “You have to have a PhD, you need classroom experience, you need to be a technical wizard, and you need to know about management. All of a sudden it just becomes too hard.”

A mentor, however, could help young professionals make sense of the vague leadership requirements. The group overwhelmingly felt that mentoring mattered. As Roberts explained, “There is a line in the military that says your responsibility is to train your own relief. That translates to our situation also. Your boss won’t think that you can be promoted if it leaves a giant hole behind you. It is in your own best interest to have a couple of folks ready to do your job.” Yet all agreed that mentoring was not well executed in higher education. The factors limiting success include the tendency not to promote from within and the false assurances created by mentoring programs as opposed to developing true role models.

The CIOs all described their peer networks as being a critical part of their professional development. They felt that networks provided them with role models and peer relationships

that have helped them develop their strengths as leaders. Mentors mattered to this group, but the definition of a mentor was different for each person. Mentoring was the composite, as Ringle described, “[of] hundreds of them. I think our profession has terrific networking opportunities. In our profession you go to conferences like Snowmass in August, and you meet a few hundred colleagues. You go to the EDUCAUSE Leadership Institute, to [National Learning Infrastructure Initiative], or whatever venue. You pick up stuff from your elders in those peer groups. This is still very much an apprentice-oriented and network-oriented profession. You need to pick it up in these group settings.”

What was most critical to them in a boss was not someone who was their mentor *per se*, but someone who saw they were ready for a challenge and gave it to them. “There have to be people along the way to put you in those situations,” stated Smallen. “I wonder to what extent we have people with the ability to be leaders, but they don’t have people putting them in these situations. Situations where you have the opportunity to deal with uncertainty are key. You don’t always see them yourself and know that you should take advantage of them. In some sense it is our obligation to put people in our organization in positions to lead.” Bleed concurred: “Now we have people that have degrees in this. A lot of good people get shuffled to the bottom of the deck if they don’t fall into the right circumstances. A lot of our world leaders are famous for the crises they endured. I agree with David [Smallen], it is about lucky breaks—sometimes being in the right place at the right time.”

All believe that their obligation to the next generation of leaders is to provide leadership opportunities. “Now, I feel that obligation to the people who report to me,” stated Smallen. “I think in all cases, you need somebody who sees you are ready for another challenge. That is what I owe to the people who work for me.”

## **Plumbers, Gardeners, and Alchemists—The Future of Technology and the CIO**

The group closed with a discussion of the future. The CIOs considered whether technology and the CIO’s influence were in decline, and as one would expect from this group, their answer was a resounding no. Said Ron Bleed, “I gave a speech with Brian Hawkins where we defined three scenarios for IT leaders. We asked if IT leaders are going to be plumbers, gardeners, or alchemists. If you’re going to be a plumber, you view IT from the perspective of infrastructure. If you’re a gardener, you sprinkle water in select areas and watch things grow. If you’re an alchemist, you take a lot of things and mix them together to make a greater good. We can play all three roles, but we are certainly being threatened with a downhill slide if we are pure plumbers. We are the ones who have to turn that around.”

On the downside, administrative technology might be in a decline. The group acknowledged that the early hype around enterprise resource planning (ERP) and the year 2000 eroded the credibility of technology in general and of CIOs as leaders. The group likened the situation more to the low point in a roller coaster ride. “It is clear that we are on the downside of the roller coaster on administrative ERP,” stated McCredie. “That was such a big deal four or five years ago. It was going to solve all kinds of problems that it wasn’t designed to solve. I think that a backlash is there—part was around overblown hoopla on Y2K. There were a set of these things out there that combined to create the perfect storm of administrative hoopla.”

But the larger, more exciting hill of learning technologies remains to be climbed. “The part that is uphill is trying to come to grips with the excitement and the vision for the core of what we do and how IT can transform learning,”

stated McCredie. “People still have the vision that IT is part of that.”

But McCredie and Roberts concurred that IT does not have all the answers yet. “We really have not come to grips with how IT can deal with the learning process,” stated McCredie. “That is what is really important. You have to have a good accounting and grading system, but if you do that 10 times better than your competitor, I don’t think that it matters.” As Roberts noted, “Part of the dilemma here is that we still have a primitive understanding of the learning process. There is a lot of flip talk about teaching and learning, but if you parse it, there is the mechanical part and the magic part. We know from a mechanical standpoint if you put up a class server you can handle the mechanical things better. But how do you reach beyond that into this other realm of magic?”

The group also discussed future synergy between IT and libraries. “I think as important as where we are today,” stated McCredie, “[is] that IT can become as important as the library.” Smallen agreed: “I think there is an opportunity there. Our librarians are feeling left out for a variety of reasons, and there is an opportunity for us to partner with them. The climate is right for these two organizations to work together.”

The group also noted that as the bar is raised for technology on every campus, the CIO will be called upon to lead a discussion of technology and the value it can and cannot provide. “Part of this dialogue should be the fact that it is too hard to do bottom-line analysis,” stated Roberts. “I was part of an advisory group to NCHEMS [the National Center for Higher Education Management Systems] in the 1970s, and we were convinced that we could create a better analytical framework for higher education. From today’s perspective it is not clear. I inject that in to say that how you view success—your own, your organization’s, your institution’s—is very context dependent.”

Yet all discussed how IT increasingly is part of what Smallen described as “the fabric of the institution. Back in the 1970s, I said to myself, ‘Someday I would like technology to be as recognized as traditional things at the institution—the library, the student center.’ We have in large respects become that. Now, we are being asked to manage it and think about it in the way that people think about other resources. We are not a different kind of thing anymore.”

Ringle described this effect theoretically. “I think we have reached a watershed; we have reached the point where technology across the board is now at the level where love/hate and boom/bust are not in cycles, they’re all the time,” he explained. “Everybody realizes that technology is critical to them, and they hate it because of that. It is like the things in my life that I never question that I have to have, such as health care. I hate to pay the bills because there is no way around it. It is an essential part of my life.”

## Conclusion

The need for CIO leadership has never been greater. The challenges faced today are numerous and familiar, among them

- ◆ declining budgets,
- ◆ increasing pressure to demonstrate technology’s value,
- ◆ rising CIO visibility,
- ◆ leading a diverse workforce, and
- ◆ managing complex supplier relations.

Today’s CIO must simultaneously lead an organization that maintains important campus infrastructure and be on the cutting edge to find new technology applications. The effective CIO leader must champion experimentation with and adoption of new technologies and work relentlessly to lower the cost of more mature services.

The job is tough, but as this group of experienced CIOs pointed out, the demands are its rewards.

For those aspiring to be CIOs, the advice is clear: spend time building an understanding of the institution's broader business. Your job as CIO will be to explain the application of technology, not to solve technical issues. Hone your communication skills and come to understand how institutions differ in culture and decision making. This will enable you to "sell the vision."

For those hiring CIOs, the advice is to focus on the fit. How does the candidate fit with your institution's vision for importance of technology? Do you seek an efficient operator or a leader who will transform the campus's use of technology? Does the candidate fit with the institution's culture? Is he or she able to adapt to different environments, or only effective in a singular set of circumstances? Remain open to individuals from diverse backgrounds. Some of the most successful CIOs did not start their careers in technology. Our experts view

these factors as far more important than the individual's technical knowledge or degrees.

For established CIOs seeking to improve, remember how much of your role is to be the visible—and many times the invisible—champion for technology. Look for opportunities to provide your staff with the leadership challenges that were essential to your own development. Maintain your adaptability and flexibility as you move from agenda to agenda. And, as our group advised, always stay a little bit crazy.

### Endnote

1. R. N. Katz et al., *Information Technology Leadership in Higher Education: The Condition of the Community* (Boulder, Colo.: EDUCAUSE Center for Applied Research, Volume 1, 2004), <[http://www.educause.edu/ir/library/pdf/ecar\\_solvers/ers0401/](http://www.educause.edu/ir/library/pdf/ecar_solvers/ers0401/)>.