What Does BYOE Mean for IT?

IT Leader Roundtable

Case Study   **May 2013**

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Highlights

Related ECAR Research Study: *The Consumerization of Technology and the Bring-Your-Own-Everything (BYOE) Era of Higher Education*

Case Study Institutions: Baylor University, Chesapeake College, University of Nebraska–Lincoln, and University of Puget Sound

Issue: The technological challenges and opportunities resulting from the growing pervasiveness of BYOE

Solutions: IT leaders discuss strategies and practices to manage and to benefit from BYOE

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The bring-your-own-everything (BYOE) phenomenon continues to gain momentum as more students, faculty, and staff use personal devices and services on campus. The person who previously brought only a laptop on campus might now also tote a smartphone or tablet and use one or all of them to access institutional networks for academic or personal purposes. Over the past year or so, BYOE seems to have reached a tipping point where it is truly beginning to impact—and in some cases impede—IT operations, causing IT leaders to seriously contemplate BYOE's implications and opportunities for their IT organizations and their institutions. To learn more about the state of BYOE, ECAR spoke with BYOE-experienced IT leaders at four institutions:

- Baylor University: private, doctoral institution with approximately 15,000 FTE in Waco, Texas

- Chesapeake College: public, associate's institution with approximately 2,000 FTE in Wye Mills, Maryland

Best Practices

- Incorporate open standards like HTML5 in mobile service access

- Use virtual desktops and hosted services

- Build ease-of-use into mobile services

- Explore cloud-based alternatives to internal services

Benefits

- Enables agnostic support of all mobile devices

- Keeps data off devices that could be stolen/lost

- Minimizes traditional client support

- Provides economical, 24/7, reliable, secure ways to ease BYOE service and client support needs

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- University of Nebraska–Lincoln: public, doctoral institution with approximately 22,000 FTE

- University of Puget Sound: private, baccalaureate institution with approximately 3,000 FTE in Tacoma, Washington

The IT leaders voiced common concerns about infrastructure and security and discussed ways IT organizations can adapt to and benefit from the BYOE phenomenon.

Background

Traditionally, IT leaders play the role of technology change agent, proactively weaving new technology into the institutional fabric. Typically it is the IT leader who advocates for a new technology, gains institutional buy-in, and manages its implementation. Sometimes, not everyone embraces these innovations; in fact, successful technology implementations may identify effective change management as a decisive factor.

In the case of BYOE, the change agent role has flipped. Students, faculty, and staff have set off a new technology force by bringing their own devices and services to campus with the expectation that they will work seamlessly within the institution's technology environment. The user community's actions are promoting change, placing IT leaders and organizations in an uncommonly reactive mode to determine BYOE's institutional implications and opportunities. As Mark Askren, CIO, University of Nebraska–Lincoln (UNL) observed, "BYOE is going to happen whether or not IT leaders endorse it."

In addition, the nature of BYOE complicates strategic efforts because it is not a discrete technology or project. In other words, an institution does not implement BYOE as it might a new ERP system or a faster network. BYOE changes the technology access paradigm, evolving from yesterday's desktop PCs and laptops to today's handheld devices. But this time, this shift occurs in a far more complex situation, meaning that IT organizations must fold BYOE into an intricate environment of multiple systems and services, wired and wireless networks, and IT security practices. And in a further twist, IT organizations have limited control over what devices and services an individual introduces into the campus technology environment, further complicating the situation.

In the past year or so, the BYOE phenomenon has accelerated, reaching an inflection point where the sheer number of people and devices using the campus technology environment has begun to have noteworthy institutional and technological consequences. This raises the question of how an institution can cope with and benefit from BYOE. What does BYOE mean for IT? To gain some perspective, ECAR invited four IT leaders, who exhibited experience with BYOE through their advisory or research role in ECAR's report *The Consumerization of*

Technology and the Bring-Your-Own-Everything (BYOE) Era of Higher Education, to share their BYOE-related experiences during a roundtable discussion.[3] This case study synthesizes their comments.

Roundtable Discussion

The IT leader BYOE roundtable was a wide-ranging discussion, looking at impacts and opportunities in the areas of planning, infrastructure, security, services, and finances.

The State of BYOE

The roundtable began with participants' describing BYOE's current impact on their respective institutions. From the student perspective, "BYOE is a quiet revolution," stated William Morse Jr., CIO/Associate vice president for technology services, University of Puget Sound. "People come on campus, wanting to do their computing, anywhere, anytime, and on any device."

However, IT leaders noted an acceleration of BYOE over the past year, saying that more and more students bring their own devices on campus and that the average number of devices per person continues to climb.

BYOE has begun to spill over to faculty, too, as they explore ways to take advantage of the presence of student devices in the classroom. They might solicit real-time feedback through student smartphones, instead of institution-provided clickers, or experiment with new teaching methods like the flipped classroom.

> *We took a measurement of the number of unique devices on our network in fall of 2011, and we experienced over a 16% increase in unique devices when the students came back from break. Merry Christmas to me! Over 4,000 of the newest types of devices to support!*
>
> —Pattie Orr, Vice President for IT/Dean of University Libraries, Baylor University, on BYOE's growth

Interest stimulates a need for faculty training. "Our faculty members don't mind if I provide 25 iPads to their students," stated Douglass Gray, vice president of technology and academic support, Chesapeake College. "But they are worried about teaching in a mixed environment of Apple, Android, and Windows devices and getting these different devices to work in the same way." Another potential impact for faculty and staff is the decline in institutional cell phone provisioning because people do not want to carry both institutional and personal devices.

Planning

Perhaps because of BYOE's diffuse nature, most roundtable participants reported little formal BYOE-related planning. In general, senior administrators' expectations mirror those of students—they want their devices to work on campus, and they look to IT leaders for informal guidance on BYOE. For example, although UNL's senior administration has not initiated any specific BYOE-related discussion, "there is certainly the expectation that I will provide guidance as to what BYOE means for us and how it can help us meet our ambitious goals to increase enrollment, student success, and research activities," stated UNL's Askren. Only Puget Sound's Morse described a formal BYOE-related goal to make the university as accessible electronically as possible. In practice, this means that Puget Sound's central IT organization builds BYOE into service delivery standards, ensuring that services support mobile access in a secure, 24/7, device-agnostic way.

Technology Infrastructure

The participants outlined two infrastructure-related items on their BYOE task lists: upgrading wireless networks, and optimizing computer lab resources.

Wireless Networks

A top priority for the roundtable participants was addressing BYOE's growing impact on their wireless networks. BYOE in and of itself "has not been terribly disruptive when this person or that person has this or that device, and they use them intermittently," stated Pattie Orr, vice president for IT/dean of university libraries, Baylor University. But all roundtable participants pointed to how aggregated and clustered access, especially in common areas, libraries, and classrooms, are causing wireless networks to drown under the weight of all these mobile devices.

IT leaders reported that the exponential jump in devices hastens the need to update and enhance current wireless network infrastructure—and this is not an insignificant proposition. "We began to install our wireless network 13 years ago," stated Chesapeake's Gray. "It was built for a different time, when all of these devices weren't connecting, and people weren't connecting two or three devices to the wireless network." Puget Sound's IT organization has determined that it will have to nearly double the number of its wireless access points to support the growing number of wireless devices on its campus. Gray cited the challenge of upgrading Chesapeake's wireless network over its big, broad geographic campus area.

Computer Labs

A lower infrastructural priority was computer labs. "Students have their mobile devices, but they need ideal places to work," stated Baylor's Orr. Participants talked of converting rows of general purpose computers into community and collaborative working areas that contain public workstations, wireless access, printing, large video screens for students to share information from their own devices as a group, whiteboards, comfortable seating, and moveable chairs and tables to configure for group work designs of their choice. This can free up funding for more specialized departmental computing labs and other technology needs. The participants cited fiscal benefits of transforming general computing labs. "Given how scarce our resources are, and the demand for IT, it is hard to cover the expenses for general purpose labs, even with student fees, in our case," stated UNL's Askren. "I think it is actually in the students' best interest [for us] to encourage them to bring their devices to campus for general computing so we can reinvest the money into student workplaces, rather than refreshing the general purpose computer labs' machines." In addition, participants anticipated greater investment in departmental or specific-use computer labs that require specialized equipment and/or software.

Despite the talk of change, the IT leaders emphasized that general computer labs won't disappear. There will always be a need for some public access computers to address disparity in student computer ownership or to provide stopgap solutions if a student's personal device crashes.

Security Practices

Participants' other top priority was IT security, which is understandable, given the multitude of personal devices accessing institutional resources. Morse discusses Puget Sound's IT security efforts, incorporating security into its service delivery standards. Because its virtual desktop,

e-mail, LMS, and some community systems are hosted, nothing resides on the mobile device in the case it is lost or stolen. "We make security seamless so the people can just connect without knowing what is going behind that curtain, and hiding that complexity from them," stated Morse.

But the participants felt security was a problematic issue because IT organizations can only do so much—security ultimately rests with device owners' actions. Participants called for continual educational awareness and community training about device safety. "User training is essential," stated Chesapeake's Gray. "Whether you are storing data internally or in the cloud, your users can make all sorts of errors in the way in which they send information. Some people still send Social Security numbers through e-mail." The group acknowledged education's limited impact because when push comes to shove, the security of a device rests with its owner. IT organizations can provide instruction and information, but ultimately the owner has to implement security practices.

Software Issues

IT leaders discussed how BYOE could impact an institution's software licensing arrangements—whether institutions should adopt licensing structures that allow students to install applications on all their different devices, adopt no-cost alternatives, or pass all software purchases on to the student. UNL's Askren believes that higher education will continue to primarily use a licensed model, and he encouraged support for Internet2's Net+ Services, which are attuned to higher education needs.[4] To support its device-agnostic strategy, Puget Sound implemented a Citrix virtual desktop environment for its academic software and buys simultaneous use software licenses. This approach reduces costs because purchasing is based on actual usage patterns.

Baylor's Orr drew attention to the importance of software caching, citing a problem that occurred during the university's e-textbook pilot in the fall of 2012.[5] One software option did not allow for caching or non-direct connection to an e-book, which made simultaneous use of material problematic. "That is pretty demanding because of the large files that need to be pulled down," stated Orr. "Software that can cache the content while still controlling rights management is very important. Without that, the impact on the network and Wi-Fi access-point density required will result in extraordinary cost."

Service-Related Issues

BYOE introduces a host of service-related issues that can test the resources of even the largest of central IT organizations. The roundtable participants strategized on how to minimize BYOE's impact on their IT resources.

Service Development

BYOE implies mobile access to institutional services and resources, and in order to support the plethora of available smartphones, tablets, and other devices, the roundtable participants emphasized the need to support open standards such as HTML5 and to incorporate easily sizeable formats when adding mobile access to services. In addition, Puget Sound minimizes the use of any plug-ins in their service

> *Though it might mean extra work on our side, services must be seamless to the user. If you create barriers for users and make it difficult, they are not going to be happy with you and your services. The bottom line is that they expect that your services should just work.*
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> —William Morse Jr., CTO/Associate Vice President for Technology Services, University of Puget Sound, on BYOE service development implications

development—including Flash, Shockwave, Silverlight, and even Java—which can limit device access. "We evaluate any new service in terms of its cross-platform interoperability and the support implications," stated Puget Sound's Morse. Exceptions to this strategy are handled by Puget Sound's IT steering committee.

Ease of use is another imperative in mobile service development to minimize user handholding. UNL's Askren pointed to apps from Amazon.com or banks: "They have amazing capabilities that work with whatever browser or phone in an extremely high-volume, sensitive, and remarkably user-friendly environment. I hope we can follow that to the extent possible so we don't have to invest as much in traditional client services." This ties back to service design: supporting open standards, minimizing required plug-ins or code that needs to be set up or maintained manually.

> *More and more, everybody expects to bring their own device on campus and feels central IT needs to make them work. To support this attitude, we'll be recognizing the growing adoption of cloud-based solutions. We will be providing access rather than providing the hardware.*
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> —Douglass Gray, Vice President of Technology and Academic Support, Chesapeake College, on BYOE's service implications

Cloud Services

BYOE's 24/7 access makes it harder to schedule system upgrades and maintenance, and the roundtable participants looked to cloud-based solutions. "There is no longer any down time," stated Baylor's Orr. "When students are away from campus, it used to be quiet and easier to do upgrades and other projects. Now there are no lulls because students' devices need 24/7 access to information, and they constantly sync their e-mail on their phones and other devices. We have more and more trouble getting reasonable windows of maintenance time from our community. Our institutional systems are not funded—and I don't think they can be—for the kind of reliability that would almost never cause a required downtime. A natural result is greater interest in using hosted systems that exhibit that kind of reliability."

BYOE's 24/7 client support requirements also motivated roundtable participants to consider cloud services adoption. "If you are going to an environment where things are 24/7, you need to determine whether you can afford to provide that support or whether you should outsource it," stated Chesapeake's Gray. "Companies like Canvas provide 24/7 support for their LMS far less expensively than it would cost me. So I am pursuing more support contracts. At the same time, you have to recognize that you remain responsible to your end users. They don't care that *X* supplier screwed up; if there is a problem, it is your fault."

> *Perhaps BYOE can mean "BYO-IT staff." I don't know what that means yet exactly, but the change is pretty powerful. IT leaders have an amazing array of new potential services—and even in production services—that were not possible previously.*
>
> —Mark Askren, CIO, University of Nebraska–Lincoln, on BYOE's cloud services opportunity

Cloud-based storage services particularly captured the IT leaders' interest to ensure connection to and storage of institutional data in an institutionally sanctioned place rather than in personal Dropbox or Box.com accounts. "BYOE motivates me to negotiate an arrangement with a cloud storage provider on a more urgent timeline and to provide institution guidelines about appropriate data to store in the cloud," stated UNL's Askren. "People may still do their own thing, but at least they are not doing it because there is no IT-managed option on our campus."

Morse observed that Puget Sound's Citrix environment also provides an individual file share, alleviating some people's desires to use personal storage solutions. Chesapeake's Gray reiterated the cost savings from using a cloud-based solution as opposed to building an internal storage solution.

Fiscal Considerations

BYOE's implications—especially the wireless network upgrades—will require financial investment. Finding the money may be difficult, especially because BYOE is an unanticipated event during restrictive financial times. Roundtable participants looked for savings from the transformation of general purpose computer labs, given that there will be fewer computers to refresh. UNL's Askren offered a more strategic view of BYOE investment: "The main issue is not one of expense but of how we can blend BYOE into best practices in general, to the point where it becomes a fiscal nonevent. For example, with cloud services, we are getting some scale efficiencies that will help us offset [costs] and enable us to provide more support in [BYOE-related] areas."

Long-Term Impacts

Finally, the roundtable participants pondered BYOE's longer-term ramifications—how BYOE will impact their institutions and IT organizations over the next few years. They discussed BYOE's blurring of work/personal life boundaries and its impact on the IT organization. The first consideration was BYOE's support implications. They voiced concern that BYOE's 24/7 access will translate into the need for 24/7 support and restated interest in cloud-based/hosted services. Another issue is data-security practices. Puget Sound's Morse observed that some faculty members have already inadvertently posted material subject to the Family Educational Rights and Privacy Act (FERPA) on public spaces. "When faculty use their personal devices for work and personal things at the same time, they need to be aware of general security issues as well as their students' and their own material safety," he stated. This renewed the participants' call for user education about security practices.

The roundtable participants assumed that student and faculty use of BYOE will only intensify, but they wondered about BYOE's long-term impact on staff. They questioned whether BYOE will spur more telecommuting among administrative staff. "Will BYOE permit some institutions to take a radical stance, allowing their staff to work anywhere they want, unless they have front-line involvement with students and faculty?" asked UNL's Askren. "With the cost of administration in general across the campus, are there 1,000+ folks who could work from home? Would that be better for recruiting and retention, especially since higher education's compensation is not typically competitive?"

Staff members' path to BYOE may depend on whether they use their devices for data entry and work-related functions or for information consumption. If the former, Baylor's Orr advocated using institutionally provided equipment to guarantee certainty with institutional data and to ensure correct data handling and management practices, including following prescribed security, encryption requirements, and backup protocols. "It is going to be nearly impossible to enforce our information security requirements if everyone buys their own inexpensive laptop," stated Orr." We are getting a lot of pressure on consumerization, but my strategy is to think of it in terms of employees' information security needs—their work and the type of information they handle." However BYOE evolves for staff, Chesapeake's Gray stressed the need for effective

communication so that staff understand institutional BYOE equipment practices: "From an IT perspective, the need for institutionally provided computers makes perfect sense. From the end-user point of view, it will be a case of IT preventing me from using the tool of my own choice."

UNL's Askren concluded, "We have to try to work with our IT community—centralized and decentralized on our campuses—to take on whatever new technology emerges one, two, three years from now. We don't know exactly what it is, but the better practices we follow and the more we work together on these recent events—like BYOE—the better situated we all will be to make that future transition."

Lessons Learned

Each IT leader offered one lesson learned about his or her BYOE-related experiences for others to contemplate:

- *Accelerate self-service models:* "We need to drive our client services to the self-service model," stated UNL's Askren. "We are doing that to some extent already, but we need an order-of-magnitude shift to develop services that do not require training and that can provide innate 24/7 self-service. This is a BYOE touch point: The more we can be successful at service development, the easier and the more we can leverage BYOE's opportunities and positives."

- *Carpe diem*: "It is not your daddy's Internet anymore," stated Chesapeake's Gray. "Things are changing. You have to be flexible. You need to be prepared to grab the opportunities because there are plenty of opportunities in this new environment."

- *Focus on seamless service delivery:* "BYOE is absolutely coming, and you fight against it to your detriment," stated Puget Sound's Morse. "We need to deliver services that are seamless, where their complexity and security are invisible to the user as much as possible. Users experience this in the rest of the world and will expect higher education to deliver similar services. There is no reason we can't do the same thing."

- *Begin with infrastructure:* Baylor's Orr succinctly summarized her advice: "It's infrastructure, infrastructure, infrastructure. That is the starting point because if that gets ahead of us, we are sunk."

> *BYOE is an additional tool or vehicle to improve our connection to our students in a full-featured way. Each moment doesn't represent a breakthrough in of itself, but dozens of those kinds of additional capabilities make that mobile device just as powerful as anything we might have.*
>
> —Mark Askren, CIO, University of Nebraska–Lincoln, summarizing BYOE's impact on higher education

BYOE touches many parts of an IT organization and, in turn, the entire institution. This personal access of technology presents emergent opportunities for institutions to connect more closely with students, faculty, staff, and others, but BYOE's comprehensive nature can make it difficult to determine how to fold it optimally into current technological infrastructure and practices. These knowledgeable IT leaders offer their BYOE-related experiences and thoughts to help other institutions consider their own paths to BYOE adoption.

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Notes

1. Eden Dahlstrom and Stephen diFilipo, with foreword by Mark Askren, *The Consumerization of Technology and the Bring-Your-Own-Everything (BYOE) Era of Higher Education*, Research Report (Louisville CO: EDUCAUSE Center for Applied Research, 2013), available from http://www.educause.edu/ecar.

2. EDUCAUSE Center for Applied Research, "*Consumerization/User Provisioned Technology Survey,"* Survey Instrument (Louisville CO: EDUCAUSE Center for Applied Research, 2012), available from http://www.educause.edu/ecar.

3. Dahlstrom and diFilipo, *The Consumerization of Technology*.

4. See http://www.internet2.edu/netplus/cloud-services.html.

5. "Welcome to BU eTextbook Pilot," Baylor University, http://blogs.baylor.edu/etextbookpilot/.