Winter 2017

ACUTA Journal of Telecommunications in Higher Education

ACUTA

JOURNAL

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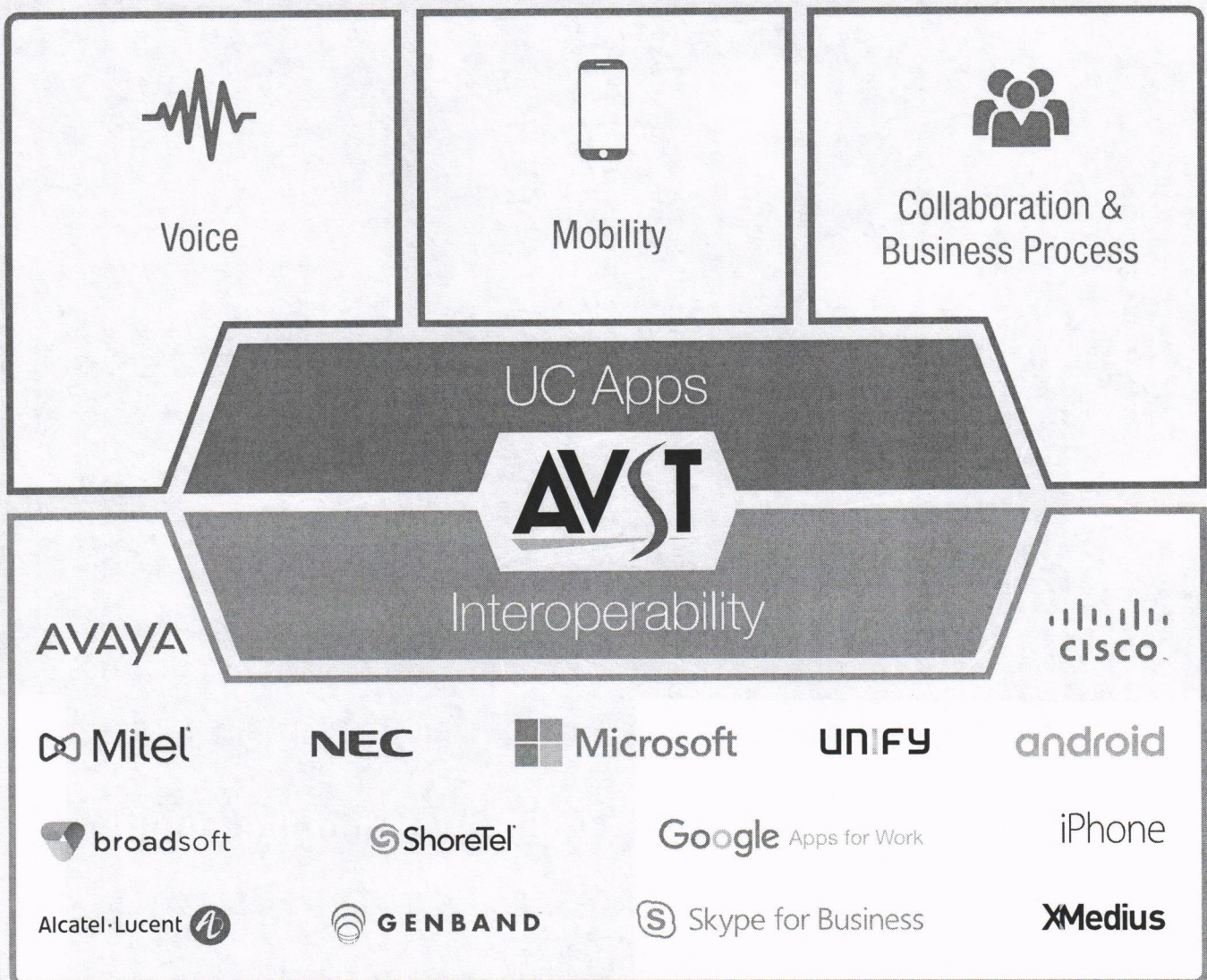
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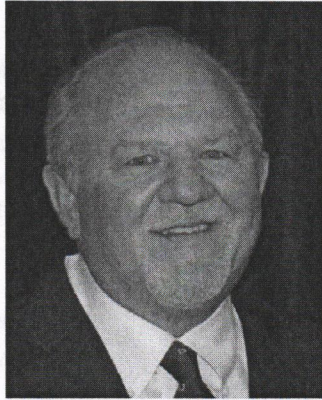
Higher education is on the forefront of influential technology disruptions. Information and communication technology (ICT) Managers are often leading the way. Success frequently depends upon building the right synergy of trusted internal and external partners to deliver the right experience and create actionable insights.

Randy Burns
Vice President
Customer
Calero Software

IT in higher ed exists to serve its customers: researchers, students, administrative staff, and university guests. Today's IT is moving away from silos and sand boxes toward partnership, collaboration, and open dialog. The success of that partnership requires the customer perspective. We must lead and guide our customers, and gain their support and trust, to develop technical solutions that meet their current requirements, and align with their ongoing strategic mission and future direction. Partnership is key in moving ahead in the ever changing, ever evolving world of IT.

Adrienne Esposito
Director, IT
Rutgers University

The Year Ahead

46th Annual Conference	March 19–22, 2017	Chicago Hilton Hotel Chicago, Illinois
Fall Seminar	October 1–4, 2017	Hilton Palacio del Rio San Antonio, Texas
47th Annual Conference	April 22–25, 2018	Hyatt Regency Hotel Dallas, Texas

Core Purpose and Values

ACUTA's mission is to advance the capabilities of higher education communications and collaboration technology leaders.
ACUTA's core values are to:

- encourage and facilitate networking and sharing of resources
- exhibit respect for the expression of individual opinions and solutions
- fulfill a commitment to professional development and growth
- advocate the strategic value of communications and collaboration technologies in higher education
- encourage volunteerism and contributions by individual members

ACUTA

Association for College and University Technology Advancement

THE ACUTA JOURNAL

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This extraordinary suite of sea changes encompasses transformations in communication technologies, the convergence of omnipresent digital services, a plethora of government mandates, and implementation offering new consumption-based economic business models. Together these macro trends are contributing to the digital disruptions in the educational experience and are reshaping all aspects of the overall ICT industry.

Larry Foster, Calero Software

TOWERING ABOVE THE REST

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By 2020, the higher-education space will start to look very different as new technologies, including VR and AI, become more commonplace and challenges with connected, secure endpoints are solved. The larger goal is to provide the best possible educational environment for students and faculty and to create environments where students can learn without limits.

Neal Tilley & Renee Patton

Welcome to the ACUTA Journal!

We hope you find our digital format convenient and enjoyable, the content interesting and useful. We welcome your comments at any time.

To share a story with our audience, please contact Pat Scott, ACUTA communications director, at **859-721-1659 or pscott@acuta.org.**

The next three issues of our *Journal* will focus on the following topics:

Spring/Summer: Providing Telephony on Today's Terms

Fall: The Business Side of IT/Telecom

Winter: Student Services: Meeting Needs and Expectations

Do a Friend a Favor: Invite a Colleague to Join ACUTA!

The Challenge of Culture to Realize Visions of the Future

by Arthur Brant
Abilene Christian University
ACUTA President, 2016–2017
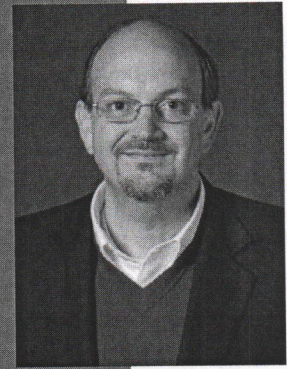
It's a bit surreal to consider that the year 2020 is just three short years away. This year, which will signal the start of a third decade of the 21st century, has been portrayed to varied degrees of gloom and awakening by science fiction movies.

In the 2000 release of Mission to Mars, a manned mission to Mars in 2020 reveals that life on Earth originated on Mars. In the 2002 release of Reign of Fire, the year 2020 is when humans kill off dragons which had been dormant until they were awaken during the digging of the English Channel Chunnel. In the 2005 release of Stealth, an artificial intelligent stealth fighter becomes "aware" following a lightning strike. In the 2011 release of Real Steel, in 2020 the sport of boxing has robots being remotely controlled by humans.

In the 2013 release of Pacific Rim, in 2020 alien monsters have infiltrated the Earth through an inter-dimensional portal at the bottom of the Pacific Ocean and the world constructs their own monsters to combat the alien monsters. In the 2014 release of Edge of Tomorrow, in 2020 an invincible alien race known as the Mimics has invaded the Earth, until a Major William Cage is able to relive the same day hundreds of times in order to kill the "omega" queen of the alien race.

While these Hollywood stylings have made for some thrilling movies, there have been other interesting predictions related to what the year 2020 will hold for us. In 2009, Ericsson (a multinational networking and telecommunications equipment and services company) socialized a vision labeled the "Networked Society" with the estimation that there would be 50 billion connected devices by the year 2020. In 2015, the company revised their connected devices estimate to 26 billion by 2020.

Another recent prediction for the year 2020 is that 60 percent of the global population will have mobile internet access. Cellular pundits believe that by 2020, the much anticipated 5G (fifth generation mobile networks) will be rolled out. Cisco has indicated that there will be 432 million public Wi-Fi hotspots by 2020, a seven-fold increase from the number available in 2015. Elon Musk, founder of Tesla Motors, has suggested that by 2020, a battery powered car will be able to travel 1,200 km (over 745 miles) on a single charge.

Gartner's predictions for the year 2020 include more compute power will be sold via the cloud than what is deployed in customers' on-premises data centers, and 40 percent of employees will be able to cut their healthcare costs by wearing a fitness tracker.

The software company Intuit, known for its financial and tax software, has predicted that by 2020 40 percent of the U.S. workforce will be so-called contingent workers (freelancers, independent professionals, consultants, and/or contractors). I've also heard that around 2020, the FCC may be ready to allow phone companies to stop maintaining the old public switch telephone network (PSTN).

As the director of enterprise infrastructure at Abilene Christian University, I'm hopeful that 2020 will be marked as the year that I retire the PBX, which ACU has operated since July 2001. The significance of this milestone is that I don't believe we'll be replacing the PBX with a similar monolithic telephone system. In the winter 2011 ACUTA Journal, I wrote an article titled "The Future of the University Telephone System," in which I noted that significant changes in the telecom industry and expectations among telephone system users were likely to alter how universities provide services to the campus. I alluded to a notion that future telephony services would be provided by unique niche solutions as opposed to a monolithic, one-size-fits-all, single-sourced solution. For the last six years I've been seeding this idea of smaller niche solutions that meet specific business requirements. Much of this work has been fueled by the observation that ACU would not provide a million dollars to replace the telephone system with one that operates and functions as the previous one did.

Over the last six years, I've found that one of the larger hindrances to implementing a significant change isn't technology, but rather its culture. There is a powerful force with the sentiment, "this is the way we've always done things." Not that this is bad or faulty ▶

logic; it's the revelation that much effort is required to shift culture. In the age of constricting budgets, culture at times can be immovable when faced with the rationale of cost savings. At the ACUTA Winter 2017 Seminar, Evangel University's chief information officer, Gary Blackard, offered a couple of astute observations, which resonated with this idea of changing culture. First, Blackard offered that "information technology needs to be a people business more than a technology business." Second, Blackard commented, "You have to build trust with the campus before you can shift the culture."

Being in the people business means that I need to stop pushing change and spend time listening to the perspectives of the faculty, staff, and students on my campus. I need to ask more questions, as opposed to reciting industry trends and figures. I need to holster my agenda and adopt a disposition of being helpful to my customers.

This week I met with a department on campus that operates one of the inbound call centers we service. In this meeting I asked the question, "What's broken with the current system?" The response was that nothing is "broken,"

but they perceive there are opportunities available with a different solution. Just that brief encounter reinforces this idea that I need to be less confrontational and more amenable to what is perceived as missing or bothersome. Being in the people business means coming to a better appreciation of the business that our people are engaged in. Being in the people business means offering support and assistance to help our people accomplish their business. Being in the people business, I'd offer, also means allowing our people to reject our offers of assistance. Relationships should matter more than process efficiencies or our specific expertise.

Building trust can come from our efforts at being in the people business. Establishing trust and developing these relationships fuels our ability to effectively engage culture and capitalize on opportunities to make changes. I suspect that many of us have experienced situations where we accepted change because we trusted the person making the suggestion. Maybe we've experienced the opposite, not accepting change because we didn't trust the person asking for the change. As one person in the audience of Blackard's 2017 Winter Seminar presen-

tation observed, "trust takes time to build and a moment to lose."

In light of the context of trust and people, I still believe that retiring our phone system, for smaller niche solutions, over the next several years is the appropriate move for ACU. However, I recognize that such a change will require considerable effort that engages people and their business and builds trust along the way. Forcing such a change will definitely doom this effort. Building consensus, illustrating opportunities, soliciting input, inviting individuals to partner, and welcoming feedback can serve this process and aid in making such a change successful. The reality I'm facing is that all of these items require time and patience. Even with 4,500 students and 800 faculty/staff, ACU doesn't turn on a dime. It may take nine years to realize the perception I offered in 2011. However, if I'm able to develop trust and confidence among the faculty, staff, and students of ACU that IT is in the business of people and not just technology, I perceive this is time well spent.

Share your comments and ideas with Arthur at branta@acu.edu.

While this is not all of the initiatives, it is a good starting point. Your partners should know they can call you if they have a question, but they should also know you are not a help desk. The BRM office should route day-to-day problems to a service manager or help-desk employee so they can focus on time building the strategic relationship and moving both the business and IT forward.

BRMPs should be good communicators, able to speak "non-geek," as more and more top leaders are not trained in technical issues. BRMPs need to be able to explain the technology at a high-level. This could be challenging to new BRMPs as they need to have a general under-

standing of all the offerings within the organizational unit, the ongoing projects, and any new or retired services.

Business Relationship Management is not just in IT any more; the framework is moving into Human Resources, Finance, and other organizations. The models and strategies learned in the official BRMP training can provide significant value to any institution, whether they define a position or are universally applied.

Customer satisfaction as well as the relationship between the business and IT has definitely improved since Texas A&M University implemented BRM. We no longer use the word "customers", as we do not see them as simply someone who consumes a product. Instead they are our partners, we work together with them to

provide meaningful service that provides value. Our partners see value in BRM's as they feel communication has increased between IT and the business, services are improving and IT is becoming more transparent. Partners feel their voices are being heard, changes are being implemented and they have a champion who is on their side. Business Relationship Management is about Continual Service Improvement, thus by keeping the lines of communication open, being transparent and working with your business partners, your organization is sure to see growth through the use of BRM.

Jana McDonald is Business Relationship Manager at Texas A&M University. Reach her at janam@tamu.edu.

Business Relationship Management:
Does Your Organization Need It?

by Jana McDonald

Does your organization need Business Relationship Management (BRM)? The answer is a resounding "Yes," whether you are a small college, large university, or corporate partner. BRM, the liaison between the business and IT, is key in any organization.

Officially, BRM stimulates, surfaces, and shapes business demand for a provider's products and services and ensures that the potential business value from those products and services is captured, optimized, and recognized. What does that really mean? BRM helps both the business side (customers) and provider (IT) work together to understand how IT can provide value to the business and work toward creating a strategic partnership. The "Business Relationship Management Maturity Model" provides a scale of five maturation levels leading to the ultimate goal of Strategic Partner.
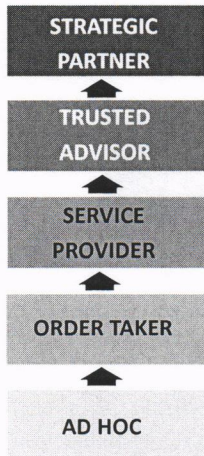
Ad Hoc organizations, commonly known as "Loudest In, First Out," are run very chaotically, with no clearly defined business processes. The value perceived by the customer is little to none, the product too expensive. Typically, you use Ad Hoc businesses when you have no alternative.

"Service Provider" is where IT gets it right most of the time on daily routines, but big projects may not run quite as smoothly. The business sees IT as providing some value, but not enough to trust them with a seat at the executive table.

Level 4 is a Trusted Advisor, where there is mutual respect between the two

STRATEGIC PARTNER

TRUSTED ADVISOR

SERVICE PROVIDER

ORDER TAKER

AD HOC

organizations, and they both understand that by working together they can increase the perceived value. At the top, Strategic Partner, the business and IT are in sync, the business realizes IT is critical to their success, and IT is there to support the business. The further you move up the ladder, the more engaged the business and partner become, thus creating shared goals and value realization.

Two things are important to keep in mind when thinking about the Business Relationship Maturity Model. First, the provider (IT), will not always be at the same stage with all of their customers, depending on the maturity levels of both organizations. For example, you may have smaller departmental IT units across the campus that are your customers. Some of these units may be very organized and mature in their operations, while others may be disorganized. As IT, you would be at two different levels on the Maturity Model with these customers. The business and provider move up together on the chain; it has to be a mutual growth, not one-sided.

Secondly, you do not necessarily want to be a Strategic Partner will all of your customers. Some might never have a vision and goals that are aligned with your mission, and that is perfectly fine. For example, would you want to have a strategic partnership with an international hamburger chain? Probably not. Personally I would like them to be nothing more than a Level 2 Order Taker, where I engage the business when I need something, and they leave me alone when I do not.

Business Relationship Management Professionals (BRMPs) bring value to an organization as the go-between for the business and the provider—advocates

for both sides. One main goal of a BRMP is to enhance communication and increase value between the two groups. Honesty and transparency help increase the business partner experience, which in turn leads to the partner sharing more information, in turn allows IT to plan appropriately, thus creating a positive experience, and the cycle continues. This process allows for better project performance and increased customer satisfaction, moving the business partner relationship up on the maturity ladder.

In the Real World

How does this play out in the real world, and what noticeable benefits can be expected? Think of BRMPs as your "high-level" customer service reps. They should have a seat at the executive table on both the partner side and the IT side. If the ultimate goal of BRMP is to work toward a strategic partnership, how can one effectively achieve this without understanding the business' values and principles, as well as IT's? Ideally, BRMPs should meet with their partners at least three or four times a year. During the initial meetings, BRM should be explained and the purpose and expected outcomes identified. The following are several key initiatives implemented at Texas A&M University:

- Improve the flow of information between IT and our partners
- Increase our partners' ability to easily gain access to services and supporting information
- Transition our organization from a commodity broker to a strategic partner
- Offer improved visibility among IT leaders to stimulate ideas and conversation, identify partner needs and opportunities, and shape the IT service offering to meet partner demand.

Predict Your Organization's ICT Future by Making It Happen

Six key influences are affecting the ICT revolution

by Larry Foster

Every information and communication (ICT) manager, especially in higher education, who is reading this article knows that the heritage days of purchasing and managing a PBX system through a 10-to-12 year obsolescence life cycle are now a historical footnote. The multi-faceted changes every telecommunications service and delivery operation is facing today are unprecedented. Never before have ICT managers had to simultaneously strategically plan and execute the combined and comprehensive challenges illustrated in the diagram below.

This extraordinary suite of sea changes encompasses transformations in communication technologies, the convergence of omnipresent digital services, a plethora of government mandates, and implementation offering new consumption-based economic business models. Together these macro trends are contributing to the digital disruptions in the educational experience and are reshaping all aspects of the overall ICT industry. Strategic planning is now an ever-continuous iteration that is no longer isolated to an annual, biannual or triennial planning event.

This article will provide some clarification to the six key influences affecting this ICT revolution. ICT managers will benefit by understanding how these wide-ranging changes may affect your short and long-term strategic planning. ICT managers need to avoid inadvertently concentrating on reacting, sustaining, and surviving and instead leverage this information to establish the right priorities to progressively evolve your ICT business services into a recognized key strategic enabler for your organization with a thriving future and desirable career options. This ICT revolution is

Figure 1. Disruptions to ICT Business Services

Figure 1. Disruptions to ICT Business Services

Technology Transformations — Business Transformations

WebRTC with Unified Communication & Collaboration

Cloudification of ICT Services

Internet of Things IoT

FCC 2020 "All IP Network" & Net Neutrality

Fifth Generation Mobility 5G

CapEX to OpEX Consumption based business models

Disruptions to ICT Business Services
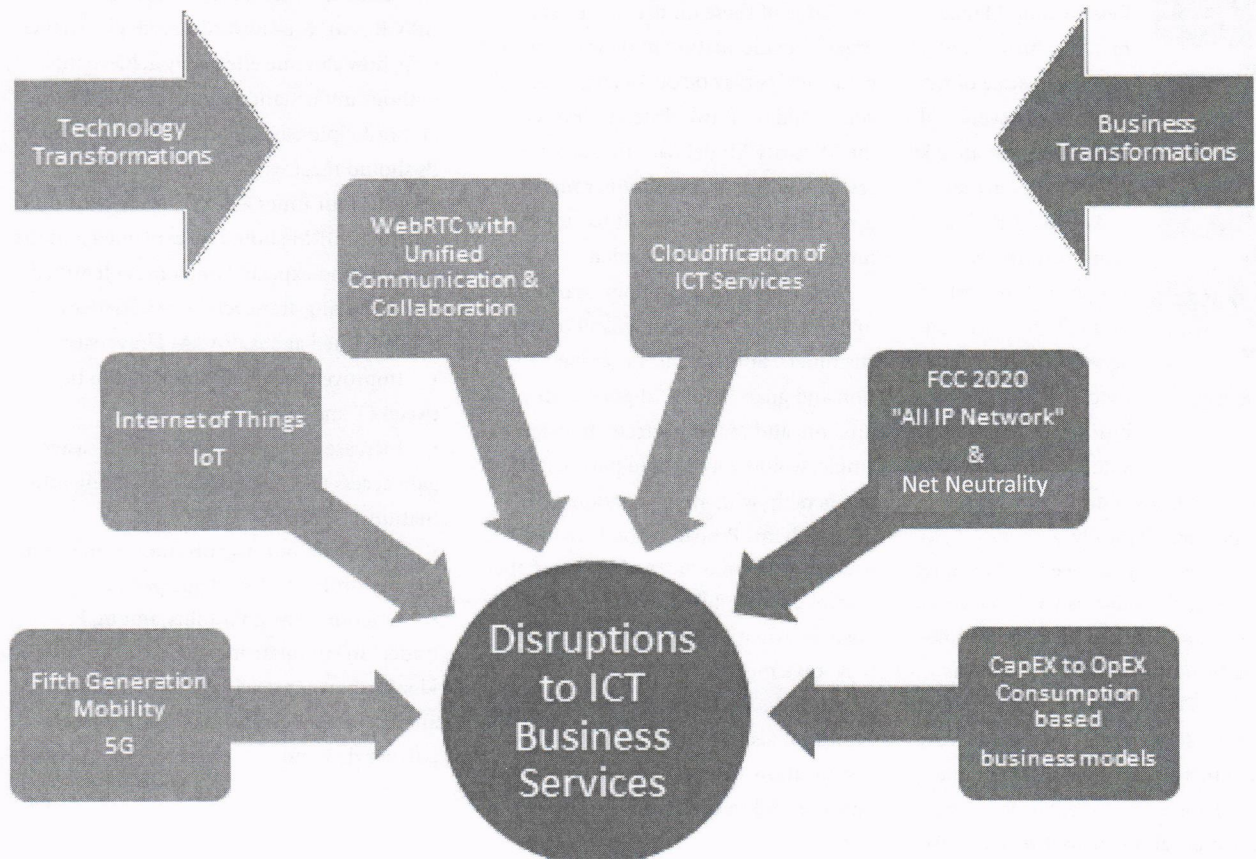
entering an inflection point where we will see accelerated proliferation of ICT-enabled changes across every aspect of the education process, the economy, and the world over the next decade, fostering profound economic and social changes.

Mobile 5G

5G is a new end-to-end ecosystem designed to enable a fully mobile and connected society. The evolution to 5G is one factor spurring the advancements in ICT by creating ubiquitous terrestrial broadband infrastructure. The next generation of mobile communication (6G) will integrate to satellite networks to enable extra-terrestrial communication. 5G networks are not going to be a monolithic network entity but rather will be built around a combination of technologies: 2G, 3G, LTE, LTE-A, Wi-Fi, M2M, etc. In other words, 5G will be designed to support a variety of applications such as the IoT, connected wearables, augmented reality, and immersive gaming. 5G net-works will offer the ability to handle a full spectrum of connected devices and a myriad of traffic types. For example, 5G will provide ultra-high-speed links for HD video streaming as well as low-data-rate speeds for IoT sensor networks. Although there is not yet an official service definition of 5G, it promises a quantum leap in mobile broadband; 40x Gbps improvements in speed and much lower latency which will dramatically change the user's mobile experience.

The fundamental technologies that enable 5G include millimeter wave (MmWave) spectrum of 30-to-300GHZ, multiple and massive antenna systems (MIMO), and low-powered radio access small cells. MmWave technologies make it possible to utilize the vast amount of new spectrum for mobile communication; massive MIMO extends the range and increases spectral efficiency in these frequencies by employing a large number of antennas; small-cell technologies provide the means to deploy a ubiquitous wide-area mobile network with a large number of small cells supporting every

aspect of a specific geographic region like a campus. Collectively, these technologies enable 5G mobile broadband to support much larger capacity, much higher data rate, and much denser deployment than 4G, which will allow users to seamlessly switch between private networks and public networks.

We are just starting to see the emergence of many new 5G-enabled applications in transportation (driverless cars), remote operations in healthcare, manufacturing, and content delivery (virtual reality and ubiquitous access), which will affect the way students experience and consume content. ICT managers need to start their research and engage their customers now to start strategizing ideas and prototyping new services that may be enabled by the emerging 5G technologies. Many carriers are targeting 2020 as general availability for 5G.

IoT

ICT managers will benefit most from IoT by not thinking about the physical technology but rather about how they can personalize their customer's user experience. The most simplistic way to embrace IoT is to conduct a simple three-step assessment as to how IoT may transform the services that can be delivered to customers:

- Step 1 – What benefit can be achieved by incorporating intelligence to an existing "dumb device"?
- Step 2 – What benefit can be derived by connecting an intelligent device to a network?
- Step 3 – What transformational service can be created from this new intelligent networked device?

A simple well-known example of IoT is how in 2007 Apple incorporated network capabilities and intelligence into a legacy MP3 player dumb-device known as the iIPod to create the iPhone. Once the iPhone was created, it became a portal to access and consume all sorts of content anywhere and anytime. The real value achievement of this new intelligent device came from the proliferation of

cloud services such as the iTunes store, digital music stations, YouTube, the Web browser, and the plethora of over 2 million applications now available on the application store.

Following the precedents established from the initial Web development, it is anticipated that higher-education institutions will lead the way in developing many new 5G solutions. For instance, ICT managers can leverage mobile development platforms to create new services for their students such as "campus event application" that allows students to seamlessly meet, communicate, and schedule events with anyone in their specific classes, instructors, or tutors. This is just a simple use-case that parallels the growing popularity of conference mobile applications. Some other obvious examples that can be envisioned relate to changing the user experience for registration and improving campus security, smart buildings, classrooms, and parking facilities.

WebRTC with Unified Communication & and Collaboration

As a discrete technology, VoIP has been around for almost two decades. However, over the last few years, the capabilities to create an inexpensive and seamless unified communication experience for all data streams—voice, video, IM, e-mail, conferencing through WebRTC (Web Real Time Communication)—is enabling new integrations that are dramatically transforming the user experience.

WebRTC allows real-time communications to have purpose and be contact and context specific. WebRTC introduces new applications that are suitable for devices in IoT, telecom services, television, and general ICT services. For example, instant messaging and capabilities of video can be integrated at service terminals connected across a campus or even within a professor's personal web page. These experiences can be enhanced with two-way audio video, remote control, and screen sharing. It is easy to envision how this type of capability can virtualize the

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concept of a faculty's "office hours." WebRTC allows real-time data to be integrated quickly into applications and websites. WebRTC is transforming the idea of purchasing a limited hardware-based telecom system into the idea of investing in creating your organization's personalized telecommunication-enabled cloud API-based service platform. The new capabilities of this system can evolve all manner of interactions in terms of efficiency, location, and impact.

Cloudification of ICT Services

ICT organizations need to progressively embrace the paradigm shift from owning and managing premises-based technology services to operating as a technology broker on behalf of their customers to research and broker the most optimal services required to support their business activities. Migration to cloud will not be a wholesale immediate change, but nevertheless represents a sea change in the way services are acquired, implemented, managed, and invoiced. ICT organizations that have failed to get out in front and lead this inevitable transition are finding themselves mitigating the unplanned financial implications and security vulnerabilities resulting from disorganized "shadow IT" operations. The diagram in Figure 2 illustrates and summarizes how the cloudification of ICT services is ushering in new opportunities for ICT managers to enhance their value proposition by helping organizations acquire the most cost-effective services and ensuring that they pay only for the services they use.

Governmental Driven Changes - FCC 2020 All-IP Network & Net Neutrality

There are two key federal government initiatives that play a critical role in this ICT revolution. The time frame and constructs of the FCC 2020 Ruling are well-defined, locked, and loaded. The FCC 2020 Ruling sets the requirements and date to replace all legacy TDM voice services with universal digital IP networks. There are also derivative elements that promote the connection of 100 million broadband users, restricting the wireless spectrum for broadband and restructuring the FCC Universal Service Fund to subsidize the transition. Every commercial telecommunication provider has been working on its transition for several years. Enterprise ICT managers need to be executing their respective portions of this transition to ensure they are not caught in an unfortunate reactive position as we approach 2020.

On the other hand, the results of the 2016 presidential election will inevitably alter or at least severely weaken the FCC 2015 ruling on Net Neutrality. The House has already passed a "No Rate Regulation of Broadband Internet Access Act.."

Figure 2. Fundamental economic shifts

Common Cloud Service Pricing Models

Cost Per Unit of Usage

Committed Expenses

1. **Dedicated** = Exclusive committed use of infrastructure for a single customer
   - Applications – Compliance, Security, Known sustainable usage requirements

2. **Open Capacity** = Continuous *"eBay type open bidding"* for unused capacity
   - Applications – Transient workloads that are not time insensitive

3. **Reserved** = Temporary commitments for future utilization
   - Applications – Procurement hedge for potential known periodic spikes like end of month cycles

4. **On-Demand** = Pay as you go with no commitments
   - Applications – Variable workloads that require assurance of availability

ICT organizations should provide detailed insight into actual consumption to optimize procurement opportunities on behalf of entire organization

Although the current administration vetoed the law, the new administration has already signaled its strong disagreement with Net Neutrality and will most likely embrace a more free-market approach to managing Internet access. This will usher in a new era of managing quality and throughput of digital services by data stream—voice, video, IM, FTP, e-mail, HTTP, etc.

Combined with the cloudification of ICT services, this will have an impact on how ICT managers negotiate, rate, and chargeback for bandwidth consumption by the specific type of data stream. Fiscal officers that are focused on optimizing costs will mandate real-time intuitive financial insight into their network service charges and most likely become critical of legacy socialized methods to normalize network service costs across all consumers. Our experience working with a broad spectrum of clients at Calero shows that less than one percent of mobile users consume 15-20 percent of all data. ICT managers should plan to process and aggregate meta-data and provide financial reporting that will help their customers effectively plan and manage their budgets.

Evolving Business Models from CapEX to Consumption-Based OpEX

Figure 2 illustrates the fundamental economic shifts from traditional capex/premises-based procurements to pay-as-you-consume consumption-based or cloud-based services. Historically, ICT managers weren't concerned about the actual usage because the capitalization of the network service was independent. However, as the diagram below shows, monitoring real- time consumption of services and timely repurposing of unused subscriptions will have a direct impact on budgets. Our experience working with clients migrating to cloud platforms shows that although consumption starts low, the "financial shock-and-awe" associated with the rapid cost accumulation of storage combined with progressive increases in bandwidth, CPU utilization, and memory quickly attracts the attention of cost-minded CFOs and other fiscal officers. ICT managers need to provide insight into every aspect of subscriptions and service consumption which includes power, data transfer, CPU, memory, storage, operating system, and business application. Paradoxically, the shift to outsource ICT services will create a greater need for ICT managers to implement more detailed and intuitive line-item cost accountability. ICT managers can learn more about their options by visiting Calero's website.

Conclusion – Wake Up and Change Your Brand

Your brand is the customer's value perception of the qualities and attributes of the services you deliver.

Ironically few consumers care about any of the details of ICT – information, communication, or technology. Yet those are the primary titles of the brand ICT organizations promote to their customers. Customers simply care about the outcomes they achieve from ICT-enabled services. The current business transformations have created seismic power shifts and are ushering in new roles for ICT organizations. ICT is no longer just about managing telecom networks, devices, and software, but rather about facilitating an ever-growing spectrum of digital services for knowledge workers. The logistical and technical requirements to deliver cost-effective education encompass every aspect of the requirements to support the modern day knowledge worker.

Because ICT digital services encompass the full spectrum of services enabled by mobile, IoT, UCC, and cloud, ICT executives need to formulate a new strategic brand by first recognizing that providing a service means delivering value to customers by facilitating particular outcomes that their customers want to achieve without the ownership of specific costs and risks. ICT organizations facilitate the critical role as the primary technology broker and fiduciary agent for all their clients' services. Fiduciary agents act for the best interest of their client by conducting duties in good faith, establishing trust and confidence, conducting due diligence, and providing full disclosure and portal-enabled financial accountability for the services they provide. By embracing these concepts, ICT executives will learn to establish and articulate a new brand with their customers akin to the brand that their clients maintain from their reliance on other highly personalized SME services such as financial investing, healthcare, and legal counsel.

Larry Foster is executive vice president, product strategy, at Calero software, and an active participant in ACUTA. Learn more about Calero at www.calero.com.

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> "There is no reason for any individual to have a computer in his home."
> —Ken Olsen, founder of minicomputer company DEC

Safeguarding Campus Networks in an IoT World

An effective security strategy helps streamline protection and management of new IoT devices

by Gerri Hinkel & Bob Filer

*T*o borrow an apt metaphor from the summer 2016 *ACUTA Journal,* the freight train called the Internet of Things (IoT) is now crashing into your network. Gartner estimates 5.5 million new "things" are currently connecting to networks every day, adding up to nearly 21 billion connected devices by 2020. What's more, ABI Research suggests data captured by IoT connections will top 1.6 zettabytes over the same period.

While the magnitude of the collision is recent, for most higher education campuses the concept of IoT is not. The genesis of the term is attributed to researchers at MIT's Auto-ID Center, an industry-sponsored lab where Sanjay

> *Beyond the implications for compromising academic data, wreaking havoc at a large sporting event, or degrading an institution's brand integrity, higher-education institutions are repositories of our most precious assets: students and sensitive private information about each one of them. This makes everyone on your campus a stakeholder in IoT data security.*

Sarma, David Brock, and Kevin Ashton connected objects to the internet via RFID tags in 1999.

Today, IoT devices connected to campus IT networks serve an increasing number of purposes including laboratory equipment monitors, building automation and security systems, GPS units on campus buses, Apple TVs in classrooms, and flow monitors attached to plumbing pipes.

All of these types of devices, and hundreds more, usher in tremendous possibilities for improving education and the campus—from significantly reducing operating costs to decidedly boosting academics and research—as long as the integrity and trustworthiness of the value they provide and the data they generate is beyond reproach.

But therein lies the rub. Data integrity and trustworthiness rely on cybersecurity measures, which are considered the purview of IT engineers. Meanwhile, IoT device development falls to operations technologists, where the goal is creating products that work for as long and as reliably as possible.

Consequently, most existing IoT devices are relatively "dumb" and have little or no security features built into them at all, enabling them to be truly plug and play. As hackers typically aren't interested in compromising the IoT devices themselves, securing them hasn't been a concern. However, modern cybercriminals can, and do, use IoT as entry points to access wired and wireless networks, which makes securing the network very high on higher-education IT priority lists.

Beyond the implications for compromising academic data, wreaking havoc at a large sporting event, or degrading an institution's brand integrity, higher-education institutions are repositories of our most precious assets: students and sensitive private information about each one of them. This makes everyone on your campus a stakeholder in IoT data security.

Strategically Balancing IoT Security and User Experiences

With so many innovative IoT devices doubling as hacking targets, it's clear you need a new IoT security approach that addresses the unique needs and resource constraints of higher education. Successful strategies balance security needs and user experiences by following three key best practices:

(1) Establish umbrella IoT guidelines. Many institutions currently lack consistent, enterprise-wide guidelines that enable constituencies to leverage device innovations while simultaneously ensuring campus networks remain secure.

(2) Move trust demarcation close to data origin. As devices with little or no security features are inherently untrustworthy, a fundamental component of any successful IoT security initiative is building trust where it doesn't exist today. A structured methodology addresses legacy and modern IoT gear by moving the trust demarcation as close to data origin as possible.

(3) Enforce guidelines appropriately. Given the sheer volume of IoT devices expected to connect to your network, it's unreasonable to rely on manual processes to enforce the security rules you set. If your institution already utilizes a policy-management and access-control system, it's a matter of ensuring it can scale to meet IoT security needs. If your organization lacks such a system, then it's time to evaluate and invest in one.

Additionally, ensure that all three of these components include a flexible and nimble process for review and adjust-

ment to ensure academic, operational, and cybersecurity needs get continuously addressed as new IoT considerations arise.

Developing IoT Device Guidelines: Collaboration is Key

Before the intermingling of IoT devices on IT networks, device connectivity was siloed into Operational Technology (OT) and IT networks, each of which was separately managed. With IoT devices now connecting to IT LAN and WLAN networks, institutions need to rethink their security paradigms around collaborative IoT and IT security guideline development. In addition, obtaining buy-in for the guidelines across your institution's constituencies is essential for enabling enforcement without inhibiting innovation or efficiency.

Although every institution approaches enterprise-wide guideline establishment differently, assembling a cross-divisional committee is a common denominator. At large institutions, this includes all of your various groups, such as those dedicated to separate colleges, sports facilities, medical centers, and research facilities.

Regardless of your institution's size, facilities management and physical security are important constituencies to include. In the past, these groups relied on IT to assist with any technology needs. However, the ease with which IoT devices can be deployed, and the value

they provide, liberates these groups from dependence on IT, and vice versa; but the devices they connect must still comply with institutional rules. Engaging them in guideline-making reduces barriers to compliance.

In addition to following well-known security best practices, include the following components in your IoT device guidelines to deliver full protection:

• Profiling. Fingerprint/classify devices as they connect to differentiate between device types and detect imposters.

• Identity. As device MAC addresses can be spoofed, the identity of IoT devices must be supplemented with strong authentication protocols, like 802.1X, plus contextual data such as location, time of day, day of week, and current security posture.

• Posture. Conduct regular health checks on devices based on active interrogation to determine open ports, OS version, and potential known vulnerabilities. Conducting checks routinely helps ensure compliance.

For a practical example, consider a research lab that upgrades a monitoring device. It's likely that device will immediately attempt to phone home post-upgrade, but it will be unrecognized by your network in its upgraded state. Rather than establishing a guideline requiring researchers to notify IT every time they upgrade a device before they connect it, your rule could be that unknown devices

are automatically quarantined until an established verification process is completed. An automated notice is sent to the appropriate user who then completes the verification, releasing the quarantine so the device can connect.

A similar process can be applied to other connection scenarios, such as during routine posture checks. Should a device be out of compliance, such as needing an OS update, quarantine and notification occur automatically, including instructions for releasing the quarantine.

In other words, devise guidelines and standards that streamline IoT connections during initial onboarding and all along device lifecycles to ensure smooth operations and delightful user experiences.

Adopt a Connect-and-Protect Methodology

To apply the guidelines your institution establishes, you'll need to translate them into IT policies and establish a protection methodology for addressing and building trustworthiness into the IoT data that devices collect. Begin by using the red-black model for trust definition. For example, data from a building temperature sensor is considered untrusted (red) until it's protected, at which point it's trusted (black). (See Figure 1: Red-black Architecture)

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Figure 1: Red-black Architecture

Point of Demarcation

UNTRUSTED

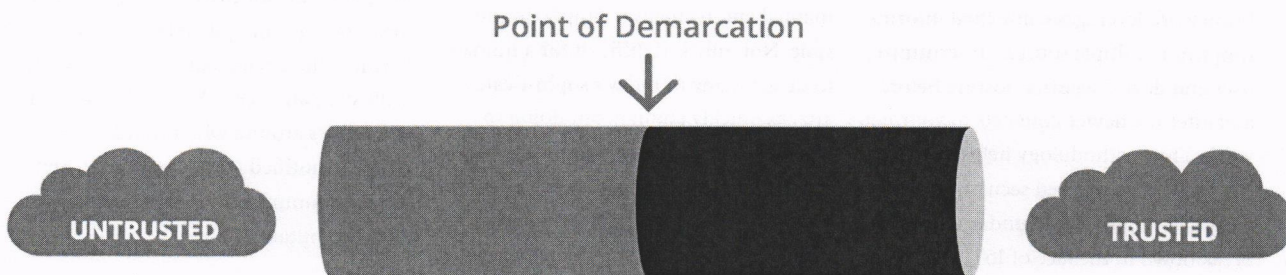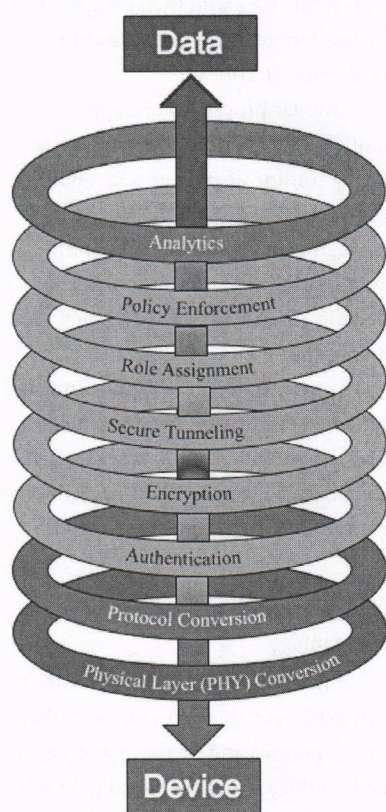TRUSTED

Figure 2. IoT Protection Mechanisms

Figure 2. IoT Protection Mechanisms

Then, adopt a connect-and-protect methodology, which moves the trust demarcation point as close to the origin of the data as possible. To do so, layers of protective services are applied within and/or around IoT devices. (See Figure 2. IoT Protection Mechanisms)

Essentially, your objective is to create a defensive framework in which no device or user is trusted until proven otherwise. A best-practices connect-and-protect framework leverages contextual information from multiple sources to scrutinize user and device security posture before and after the device connects to your network. This methodology helps overcome the limitations of fixed security perimeters tied to physical boundaries, which break down in the face of IoT devices that

can connect and work from practically anywhere. Using this layered model offers a practical way to secure, exchange, and utilize data from IoT without replacing your installed base of devices.

The following protective mechanisms are recommended for IoT security frameworks:

• Authenticating source/destination devices and monitoring traffic patterns.
• Encrypting data packets using commercial or government encryption standards
• Enveloping encrypted packets inside a secure tunnel to ensure data integrity
• Fingerprinting IoT devices to determine if they are trusted, untrusted, or unknown
• Applying appropriate roles and context-based IT policies to fingerprinted devices to control access
• Inspecting north-south traffic with application firewalls and malware detection systems
• Enforcing IT policies using all available assets in the network infrastructure

Effectively Enforcing IoT Security

No matter how sophisticated the IT policies or how robust the protection methodology, attacks on your network will be attempted, as attackers are always outsmarting the security systems people devise. This makes denying attackers the time to carry out their activities your most effective defense.

But, in complex environments like higher education, applying policies, monitoring compliance, and detecting violations must happen swiftly to thwart attacks. So rapidly, in fact, that manual enforcement is simply not possible. Not only is it difficult for a human to detect many of today's sophisticated attacks quickly enough, but doing so requires staffing levels far beyond what most lean higher-education IT departments can dedicate. Practically speaking, automating policy enforcement is

the only effective way to safeguard your institution's network. With a rules-based policy management solution for network access control (NAC), even the most budget-constrained organizations can meet suspicious activity with the needed millisecond responses.

In a nutshell, an advanced NAC solution uses the policies and rules you establish to automatically deny access, by quarantining or disconnecting a device while simultaneously alerting a cybersecurity staff member to take any required follow-up action.

Additionally, a full-featured NAC system enables communicating appropriately with the device's owner. This minimizes, or eliminates, the surprises that otherwise lead to frustration and escalation in tensions between end users, systems managers and IT when a device is "down" without explanation and for no readily apparent reason.

For example, if a building door lock tries to masquerade as a Windows PC, a robust NAC solution can immediately deny network access while notifying both the appropriate IT staffer and facilities manager. An even more advanced solution provides clear, understandable feedback to anyone attempting to use their access card at that particular door— such as sending a text message to the access-card owner redirecting them to an operational entryway.

Of course, the foregoing scenario also illustrates a point about the comprehensiveness of the guidelines your institution will require. It's not enough to set the rules for connecting devices; establish requirements for their ongoing security posture (e.g., an updated OS), and determine the circumstances for automatically denying access. You must also create guidelines around who is notified, how they are notified (text, email, etc.), and what communications content the notifications contain.

Final Thought

Finally, regardless of the specific guidelines, protection methodology, or type of enforcement automation you deploy, remember that IoT security is never once-and-done. The process of reviewing and fine-tuning must be ongoing to ensure your organization maintains the strongest defensive posture to protect all of your institution's assets—whether humans or machines—and, most of all, the students you serve.

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We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten. Don't let yourself be lulled into inaction.

—Bill Gates

What the Year 2020 Holds for the Digital Campus

Virtual reality, artificial intelligence, and big data could shape the future

by Neal Tilley and Renee Patton

*H*igher education is grappling with a changing student population concerned that an affordable traditional university education is out of reach. Additionally, today's learners of all ages expect mobility and flexibility that technology affords them in their everyday lives to be present on the college campus—whether virtual or physical. The challenge is to create an appealing, modern learning environment that is affordable for all students. Luckily, there is a massive digital transformation underway that will make it easier for colleges and universities to create world-class, differentiated environments for students.

Universities also have to be able to accommodate students who are in multiple, sometimes distant, locations in order to build a successful student population. If a university is dealing with these or similar issues, digital technologies can help. Educators who embark on digital can create student experiences that welcome all students no matter where they are located, leveraging technology to connect each student to one another as if they were all in the same room, and providing virtual spaces for students to collaborate and interact when they are not in class. This type of collaboration technology allows universities to utilize faculty resources more effectively and offer lower-budget online education resources to students.

Digital Transformation Is Happening Now

With this digital transformation, universities envision a digital campus overlay on top of a traditional campus that allows a school to reach far beyond its physical boundaries. In order to implement this, universities must transform themselves across all the key components of a modern learning environment, the core network, the devices, the applications, and the intelligent management of each so that all components work together properly. Consequently, universities will be able to deliver higher value for many of the stakeholders involved, including:

- Attracting more students by demonstrating innovative use of technology
- Lowering tuition fees
- Lowering the cost of technology (by student and by faculty)
- Offering more innovation through experiences outside of the classroom
- Doing more with less, even under dramatic budget pressures
- Extending academic experience through the Internet of Things (IoT) technology
- Offering a better mobility experience
- Offering next-generation courseware
- Matching modern reliance on mobile and immersive technology

Once a university is established through a digital-ready architecture across their physical and virtual campus, then greater digital learning techniques can be adopted to position the students for success. Universities can have access to better, more actionable data, more devices, and greater mobility. And when it's time to integrate newer technologies or move data to the cloud, it's a much simpler process.

Moreover, city governments now give research grants for the implementation of some new technologies in a push toward "smart cities." A smart city is a city that integrates many different information and communication technologies and IoT solutions to securely manage its assets, including schools, libraries, etc. These information technologies include improved networks to enable faster wireless and support for more devices. The implementation of 5G connectivity is having a huge impact on smart cities, and for all practical purposes, a digital campus is simply another version of a smart city. Digital campuses can look into government research grants for implementing technologies including 5G connectivity, making technology implementation more viable for universities with budget concerns. We see a number of emerging trends on the horizon for higher education, including 5G connectivity, but three that we believe will be most impactful in the nearest term are virtual reality, artificial intelligence, and big data analysis.

Virtually Seated in the Classroom

Citi Bank analysts are expecting the virtual reality (VR) market to grow to a $15.9 billion industry by 2019 with the market for related hardware, networks, software, and content reaching $200 billion by 2020. Enhancing human interaction and engagement all around the world, VR creates a real-time interactive collaboration format not tied to social, economic, or geographic disparities. Universities can use virtual classrooms to create an immersive learning environment that's very real and personalized to each student, creating places where students have every resource they need right at their fingertips and can experience les-

sons the same way as—sometimes better than—those students who are actually in the room with faculty. This environment helps accelerate the student's perspective on a subject or concept, as well as leaves a greater imprint for recall. An example of this type of enhanced environment is virtual cadaver rooms. Some universities are building these to allow students from all over the world to be completely immersed in the virtual environment with hands-on learning not possible otherwise.

Additionally, VR can be applied to a faculty member's full course load and allow them to virtually jump from one classroom to another, teaching the same class but to multiple classrooms at once across the world. This optimizes the instructor's time and allows for a greater reach, which benefits the faculty member, the student, and the university.

Another way universities are currently applying VR is through online resources for students and faculty. Institutions are posting 3D photos, including VR plug-ins, on college websites as well as VR applications as part of the content for curriculums.

The next few years will see VR become more mainstream in education. New ventures have begun recently including zSpace, Alchemy VR, and Immersive VR Education—companies that are focused on providing schools with packaged educational curriculum and content, teacher training, and technological tools to support VR-based instruction in the classroom.

The first trademarked virtual environment, or CAVE, was built at the University of Illinois at Chicago to create immersive learning experiences for students. Marquette University's Dr. John LaDisa used their 3D Visualization Lab in the College of Engineering to study pressure changes and disease in blood vessels. There are many more proven use cases that have demonstrated great success of 2D and 3D immersion and adoption of different types of VR technology in

hundreds of classrooms in educationally progressive schools and learning labs in the U.S. and Europe.

Artificial Intelligence Offers Real Insight

Another technology that is being considered by universities is artificial intelligence (AI). Applied to academia, AI is self-learning technology used in the classroom to improve the student experience and academic outcomes. For example, AI has the ability to streamline the time of faculty with digital tutors that ensure students who need help get additional support by learning from how the student is processing information and presenting the teachings in a way that allows the student to learn most effectively. This can typically be done to address the more rote aspects of learning. Students might need to know how to balance an equation, where those responses can be automated. A professor can then spend time helping students to understand why we need to balance equations, and circumstances under which this knowledge is applicable. AI can basically become a personal virtual assistant for professors so that they focus their time on more complex elements of instruction.

Stanford University Medical Center is one successful example of current AI user. The institution uses a smart surgical room at Stanford where one surgeon in one location can manage multiple surgical procedures located all across the world. These types of collaboration systems allow universities to better utilize resources and still have a significant impact in the industry and the world. And being able to utilize one faculty member for multiple functions without eating up additional resources can benefit the university financially. Here's a link to their AI programs in the Medical Center: http://vision.stanford.edu/pac/.

Similarly, another university in Northern California combining advancements in collaboration and wearables is set to bring a whole new perspective for interaction with patients, colleagues

during surgery and medical procedures. This trend will grow across many fields of knowledge.

Finding Academic Success in the Data

With floods of digital content and data being generated from technologies including IoT, VR, and AI, higher-education institutions will need to implement methods to analyze that data and curate content. Through data analytics, universities can track which curriculum, teachers, and collaboration technologies are most effective at the institution.

For example, through data analytical tools, a university can determine at the end of a semester why some courses produced "D" students and some didn't, and they can predict which courses will have the highest enrollment rates and which will have the fewest. Through analyzing test scores, class attendance, online participation, student demographic, teacher background, and more, data analytics can provide universities with insight into where resources should be invested.

These technologies can also help the university's leadership fine-tune internal and external digital processes. Technology has the ability to help track if an online portal isn't working correctly, what marketing campaigns are receiving the most traction with students, and whether students are having trouble reaching teachers after office hours. By being able to analyze how a university is functioning, processes and resources can be improved and made more effective, driving a higher level of success for the institution.

The University of Arizona has pioneered the use of data analytics for student success. For example, they use information from multiple disparate sources to "visualize the data, understand patterns, and take action." They state that "the data is a combination of student record information—credit hours, grades earned, academic performance, and other information—plus data that relates to student interactions with their online

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course portal, such as how early they log in to see their course syllabus or how long they spend looking at course materials, participating in discussion boards and other actions." More information can be found here.

Additionally, universities are looking at smart metrics to figure out which students will be successful, even before they set foot on the campus. This notion utilizes psychometrics to better match students with teachers based on their personality, teaching style, learning style, and overall academic objectives. It can also help to improve graduation rates, save money on tuition by not going to the "wrong" school, and possibly, make going to a university more accessible to a greater number of people.

Inherent Challenges to Overcome

Technologies that create the digital campus offer opportunities for universities not only to improve the faculty, staff, and student experience, but also to dramatically improve student outcomes. However, there are two challenges to keep in mind: managing IoT devices and securing the digital campus.

• The Great Big World of IoT Devices. One of the greatest challenges universities face is the widespread use of smart devices by students on a university's network. Most educational institutions are not properly set up to handle the mass influx of devices being used on campuses. These devices include traditional mobile phones, laptops, PCs, tablets, and now new fitness and medical wearables and IoT technologies such as sensors and cameras.

Having academic information readily available for students is a necessity to ensure efficiency and success of a university, but having so many devices accessing the university's network at one time can weaken the system. It's important for universities to work with technology partners to develop a plan to manage and secure the number of digital touch points a campus can include. Additionally, the wireless network has to be able to host all the mobile devices and process the amount of data being shared across those devices, all while staying secure.

The best technology partners to work with are those who understand these threats and take an architectural approach to the system, covering multiple components and working well within the ecosystem of technology being used by the university. It would be detrimental for a university to partner with a technology partner who doesn't understand and anticipate these challenges, leaving the institution vulnerable both from a security and reputation standpoint.

• Securing the Digital World. The second greatest challenge facing universities is security. Digital campuses are dealing with multiple end-user points (students, faculty, administrators, parents) and are hosting multiple devices (mobile phones, laptops, desktops, wireless printers, sensors, and wearables) at any given point in time. Being able to secure all access points and all devices is critical for a university to protect its assets and reputation.

Additionally, each university is set up differently based on the type of business being done. Universities that are research-based and open to a wider variety of technology innovation face greater security issues than universities that don't have a large research component to their business. They really have no choice but to secure critical research data and information. They must also secure multiple devices, end-user points, and different types of research and compute loads, which makes it even more important to work with the right technology partners who understand the academic and business needs of the environment.

Understanding the Future is Half the Battle

By 2020, the higher-education space will start to look very different as new technologies, including VR and AI, become more commonplace and challenges with connected, secure endpoints are solved. The larger goal is to provide the best possible educational environment for students and faculty and to create environments where students can learn without limits. In the next few years, we will see growth in these technologies—VR, AI and big data analytics—as they become mainstream concepts in the academic world. It's proving to be a bright and exciting future in the world of academia.

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Lee DeForest has said in many newspapers and over his signature that it would be possible to transmit the human voice across the Atlantic before many years. Based on these absurd and deliberately misleading statements, the misguided public ... has been persuaded to purchase stock in his company ..."

— a U.S. District Attorney, prosecuting American inventor Lee DeForest for selling stock fraudulently through the mail for his Radio Telephone Company in 1913.

Collaborating for Success

IU promotes a culture of excellence that also values honesty, integrity, and mutual respect

*Duane Schau,
Sarah Engel, &
Cathy O'Bryan*

As we face change on campuses of all sizes, sometimes we think we are on opposing sides—only to find that we just have different perspectives on the same issue. It takes passion, commitment, and showmanship to wake up a staid organization to disruptive change, and honesty, determination, and foresight to work together toward common goals.

By way of illustration, when tablets and virtualization emerged on the scene a few years ago, some IT professionals saw them as the way of the future, while others saw them as another fad. The reality was somewhere in between, as Indiana University's Duane Schau, Client Services, and Cathy O'Bryan, Client Support, illustrate here. Over time, both have come to see things more clearly—with the benefit of hindsight, of course, but also with an ongoing commitment to open exchange based on mutual respect.

The Great Tablet Debate

A little background first. IUanyWare is an enterprise cloud-based service that provides Indiana University's students, faculty, and staff with on-demand access to hundreds of software applications. IU began developing IUanyWare in March 2010, and moved the service into production in the fall of 2012. With IUanyWare, IU enables its 110,000+ students plus all faculty and staff to access critical software, cloud storage (50 Gb on Box at IU), and printing tools on any personal device (including PCs, Macs, tablets, and smartphones).

IUanyWare runs on virtual technology from IU's primary Data Center in Bloomington, using Indiana's I-Light network to reach all eight campuses across the state. This means the IU community has on-demand access to more than 200 applications, including Adobe Creative Suite, Microsoft Office, various stat/math packages like SPSS, and specialized departmental apps, through the IUanyWare portal (iuanyware.iu.edu).

When IU introduced IUanyWare in 2012, says Duane Schau of Client Services, "I predicted that within the next three years all students would be carrying tablets—and laptops would be a technology of the past. While I didn't claim to be a futurist, I saw our students learning across a diverse set of tools of engagement. They were framing innovation inside a larger social fabric that informed us of their wants and needs. Tablets align content and device to meet their consumer-based orientation. I said we should make every effort to meet those expectations, moving content creation from big-box stationary devices to highly personal computing devices incorporating small-screen formats.

At the same time, Cathy O'Bryan of Client Support saw tablets as the hot, mobile technology in 2012. "However," she said, "having seen the rise and fall of video discs and opaque projectors—not to mention Apple's Newton—let's just say that I'd become a bit jaded.

"As a long-time specialist in instructional technology and support, I've had to make sense of a lot of hype. There has not been a time in my experience of technical transition (since 1981) where "all" of anything applied to a population of 150,000 faculty, staff, and students. More than likely, the latest and greatest just leads to increasing diversification of BYOE (Bring Your Own Everything)."

Cathy suggested that there wasn't a single device that would rule the technical endpoint world; rather, they would collectively add to its options. "As a touch typist who depends on a real keyboard, an instructional technologist of 30+ years, and a true believer that human habits are much harder to change than most anticipate, I was willing to bet that not all would go to tablets at IU. Indeed, I thought the tablet rage will fade in a few years. Call me jaded or call me wise."

In reality, the post-PC future is not a tablet or a smartphone, but a context-aware, user-centric environment. Devices and applications interact with data in ways that are consistent with both the users' needs and device capabilities with the minimum of interference. That means an app-centric, touch-enabled, location-aware experience on a PC, tablet, or phone, and a mouse-driven windowing (small "w", but in all likelihood Microsoft Windows) environment on the desktop—all delivered through a common portal that understands context and delivers actionable content.
subhead??

If there were ever a good time for desktop virtualization, today is it. Conventional desktop management deployment implementations break down, and increasingly, the amount of manual intervention needed to keep these systems working requires one or more localized ▸

IT operations inside departments or on campuses. Most organizations would be better served by letting go of all their existing desktop management models and reinventing a new one. Virtualization in IT (IUanyWare) was massively and easily adopted by users.

Partner Early and Often

Client Support is not overhead; proactive support is best. Partner early and often to save time. In order to provide a solid support model for the virtualized desktop of IUanyWare, it is critical that we ask our teams to work collaboratively in advance of the service rollout. O'Bryan posited that a support model will mature across time, so it's essential to establish anticipated issues, handling processes, and systemic meetings to review progress. early in the development. This would take time for both the IUanyWare and Support Center teams. In the long run, this upfront investment saves time for all concerned.

Perfection doesn't come on the first try, or even in the first month. Continuous process improvement by mutual, constructive review is needed. A support staff of over 60 full-time and 80 part-time employees will make mistakes. On a contact volume of 800K+ annually, an error percentage of 1 to 2 percent is outstanding. Initial documentation can be led by Client Support, but must involve an engaged and accountable member of the IUanyWare team. Planning is everything for a successful, useful rollout. Collaboration is the only way for UITS and others to be successful as IT service providers.

Client Services found that time and resources don't always exist with large, innovative, disruptive projects. During Phase I of the IUanyWare project, Client Srvices designed, built, and delivered an enterprise-class, server-hosted virtual desktop environment. It was a large collaborative effort involving the vendor, UITS engineers, and local IT professionals (IT pros). The scope of the engagement included well over 75 departments, each with its own approach to managing devices and delivering applications. The focus concentrated primarily on the localized IT pro handling support, which we learned was a model that had some significant shortcomings from the lens of the enterprise.

Phase II involved a massive use case: delivering a mobile computing lab for 100,000 students. This mobile computing lab provides student access to a vast software library, with integrated printing and file storage from any device (iOS, Android, PC, Macintosh, or Linux environment). We learned powerful lessons around collaboration with this project—especially the advantages of a model that not only included the IT Pros but also support, infrastructure, and communications groups. Both Client Services and Client Support were right—and wrong. It was continuous collaboration with open, frank, and sometimes difficult conversation that enabled the IUanyWare service to succeed.

Personnel Management

Schau says the view in Client Services in the past was that innovation, expertise, and technical talent at the top five percent of what? was worth everything. UITS recognized that human capital is the most important asset that we have. This is reflected both in the budget (percent salaries) and in the world-class training (i. e., Management of Risk or MOR) that we give our staff.

Much of the traditional thinking in Client Services lingers today. "We recognize the vast range of job types in our organization," says Schau. For example, staff who provide customer support need a vastly different skill set than developers. Resolving customer problems requires precise answers delivered with finesse and sensitivity to customers, who may be very agitated by their technical issues. Developers, on the other hand, need deep technical skills and often work in solitude for long blocks of time. Vast employee cultural diversity is one of our key strengths. Fitting these pieces together in an orchestrated and harmonious way is always challenging. UITS needs all employee types, with a vast range of social styles and cultural backgrounds. Our managers and directors work very hard to recruit, retain, and advance our staff's careers. These are some of the most satisfying aspects of our jobs."

O'Bryan suggests that "at UITS we have incredibly talented staff who are dedicated to their roles. But operational excellence is as important as creativity and innovation. UITS cannot be successful if we all just do our own thing and fail to work together. No one is above cultural values of respectful behavior and integrity that we, the leadership of UITS, expect from all 900 staff in our IT shop.

"No one—no matter how gifted, revolutionary, or hard working—can ignore the need for teamwork in an enterprise-wide service rollout. That means respecting others' expertise by showing up, being responsive, embracing collaborative work, and following leadership guidance. It also means recognizing the competencies of other teams and finding ways to play to everyone's strengths. Fantastic engineering talent must recognize the need for fantastic support and communications. We're both sides of the same cultural coin. None of us can go it alone, and we should all be held accountable to the organization's proven core values."

The truth is inevitably in the middle ... in that very messy area filled with ambiguity that only fully informs leadership when we actively practice open conversation based on a shared belief that mutual respect, diversity of perspective, and underlying foundational recognition make us strong. The fact is, our ability to debate, discuss, and sort through these issues has changed Client Services' perspective substantially from the original stance explained here.

Client Services says now: Regarding support, proactive support is essential. The service creation process naturally

needs to include Support (and other associated groups), by design at the beginning of the proof-test-innovate domino chain. Emphasizing a model that is inclusive lessens chances that the service and service providers are perceived as a burden. The model provides sufficient preparation for a successful innovation domino chain. How to reduce the overhead that Support MUST bring to the service rollout should be constantly evaluated for unrecognized opportunity.

And as to personnel, like all the other issues, as the hard conversations take place we're working this one out. We've done it every time before. We have faith in our trusted, open, and respectful relationship built on honesty and a mutual desire to make UITS as successful as it can be.

Doing what we can to retain top quality talent in tight IT labor markets is worth a lot but not everything. An essential component of organizational success is requiring staff to get along and coalesce around agreed-upon standards and practices. It is vitally important for leadership to provide feedback/redirection as soon as possible when a less-than-desirable behavior arises. There is a cost/benefit conversation around technical contributions versus the employee's ability to change. In situations like this, it is important to gauge improvements resulting from the conversation—and hopefully, over time, steer the employee to be a better colleague. Frank discussion is important, but unity and harmony are necessary for the greater good.

Going Forward

Both departments say now: Our shops (directorates) are very different. Client Support requires flawless execution of systematic, high volume, complex processes while dealing expertly with difficult customers in real time. Client Services depends on individual creativity, initiative, deep technical skills, and subject matter expertise. It mostly does not operate in real time, and often falls outside of working hours. Developers and system administrators have more freedom to structure their own time, in service of their group and individual responsibilities.

This is Yin and Yang. This is Tao. Our strength as leaders comes through in our commitment to open (if at times difficult) conversations and diverse (if at times very different) perspectives. To promote a culture of excellence that also values honesty, integrity, and mutual respect, we need to set the tone and give our staff responsibility as well as accountability. It's not us versus them. We're on the same team, and we have the same end goals. It's only by working together that we can keep up with the fast pace of change in the world of IT, meeting and exceeding community expectations.

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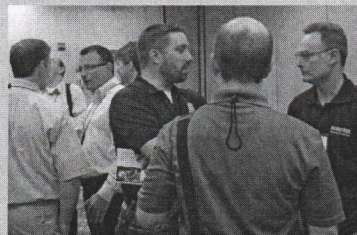
The Campus of the Future: 2020 and Beyond

What does your vision of the future include?

by James S. Cross, PhD

"Prediction is very difficult, especially if it's about the future."

Niels Bohr, physicist

*T*he next wave of technology evolution continues to build momentum in the U.S. economy as we are introduced to long term evolution (LTE), digital signal processors (DSP), near-field communications (NFC), virtual reality (VR), artificial intelligence (AI), augmented intelligent reality AIR, and intelligent mobile computing devices (IMCD). LTE is poised to become the first truly global mobile

> **With costs falling rapidly and increased global connectivity, the worlds of transportation, collaboration, and language transparency are rapidly changing the way people stay connected worldwide with a mobile, go-anywhere communications infrastructure.**

smartphone standard even though the frequency bands vary from country to country. The exponential rise in demand for IMCD has advanced by leaps and bounds as new dual-core powerhouses provide the following key features:
- Point-and-shoot camera
- Display resolutions that exceed the limits of the human eye
- Near-field communications technology that enables payment by phone by waving a phone in front of

a payment kiosk in place of swiping a credit card
- Siri-type voice activated intelligent assistant agents
- Augmented intelligent reality

Whether you are a college or university; local, state, or federal government agency; or private business, the next wave of mobile communications technologies is essential to success. Today's generation of IMCD technologies is transforming mission-critical operations and critical core services with rich-media applications and services. With costs falling rapidly and increased global connectivity, the worlds of transportation, collaboration, and language transparency are rapidly changing the way people stay connected worldwide with a mobile, go-anywhere communications infrastructure.

As the PC era wanes, the IMCD apps ecosystem will drive future access. The ability to access big data with analytic apps-empowered IMCD devices makes all kinds of things possible. The intelligent mobile collaboration apps offer colleges and universities the opportunity to leverage and get the best of all options in launching new services, remaking/remodeling the curriculum, and provisioning degree programs and services and will impact how they are perceived in the marketplace.

Mobile Computing Demand

With the exponential rise in demand for mobile computing, deployment

has become critical in the marketplace. "The worldwide mobile computing market is poised for continued double-digit growth in the years ahead. Strong end-user demand, broader selection of devices, and lower price points will drive shipments higher in the years to come," says Ramon Llamas, senior research analyst with IDC's Mobile Phone Technology and Trends team.

The next-generation IMCD technologies will continue to transform critical operations and core services with broadband connections, rich-media applications, and collaborative-friendly devices to support a plethora of current challenges and active research projects. For example, 90 percent of new drugs tested on people either do not work or fail to produce satisfactory results. These failures are an expensive part of the estimated $2.6 billion dollars it costs to bring a new drug to the market. The following are some of the high-tech research endeavors involving IMCD technologies that were once thought impossible:
- iChip. A research lab in California is working with Lawrence Livermore National Lab to build a replica of the human body and/or organs on a chip (iChip) and customized human DNA sequence chips to test new drugs.
- Inferno. A team testing blood samples from around the world for new deadly microscopic viruses.
- MEL Science Chemistry Set. A

research team using virtual reality to help experimenters visualize chemical reactions.

- RobERT. A research team at the university of London using artificial intelligence to scan deep-space data for sign of habitable planets by scanning tiny fractions of light reflected by its stars.
- Absorb. A research effort focused on perfecting a body-absorbable, disappearing cardio stent. http://myheart.net/articles/the-new-disappearing-absorb-heart-stent/
- Amgen genetically engineered virus. The virus will be used to reprogram the human immune system to attack and kill cancer cells or other deadly viruses.
- Second Skin. A research effort focused on treating sun-damaged skin discoloration and wrinkles as a coating that mimics undamaged areas.
- Rancor. A research project by the Star Wars junkie, Jeremy Fisher, to craft and develop more creative and captivating space age cosmic characters.
- AI Brewmaster. An INTELLIGENTX Brewing Company research project that integrates AI into its brewing algorithm. Taster feedback is integrated into the brewing algorithm process by an AI system.
- CRISPR. A genome-editing plant project at USDA to enhance edible plants taste, texture, smell, and shelf life.
- LetGirlsLearn. A research project focused on the over 62 million girls globally who are not in K12 school programs. Research suggests that girls empowered with an education will delay marriage, have fewer children, and earn a higher income and are more likely to invest more in their families and communities.
- Chatbots. A Facebook project to infuse characters with artificial intelligence to mimic human conversation. Chatbots can help organizations and businesses minimize the human effort required in communicating with customers and partners. Chatbots are a feature in Facebook Messenger, one of Facebook's fastest growing products, with over 900 million users.
- WHATSAPP encryption. An Open Whisper Systems project to enable end-to-end encryption for voice, text, photo, and video files.

College and university faculty, staff, and researchers will require future IMCDs to be multi-band with encryption for roaming globally as key members of the above and other active research initiatives.

The Mobile Intelligent Edge

The computing era has been defined by a struggle between the center and edge scenario. The center scenario focuses on mainframes, and the edge scenario focuses on terminals, minicomputers, and PCs as nodes on the edge. Terminals quickly defined a new edge node with minicomputers and PCs emerging in the 1970s and early 1980s as intelligent nodes/clients. The PCs became the preferred intelligent clients to the center scenario mainframes until the emergence of the mobile intelligent edge smartphone.

The rise of intelligent nodes/clients marked a fundamental change in the center edge scenario struggle. Mobile computing at the edge gave rise to yet another change in the center and edge scenario with the mobile intelligent edge (MIE). The mobile intelligent edge supported the rise of the cloud as the center for

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the Internet of Things. The cloud as the center for the Internet of Things enabled elasticity on demand, infinite expansion, greater economies of scale and lower costs. The elasticity option let key organizations' users scale quickly at lower cost points by letting big-data applications increase and decrease capacity as needed. The elastic intelligent cloud is a virtual intelligent center of a network of clouds worldwide where huge sites are mirrored in many places for anytime anywhere access/process expansion/contraction.

The Next Technology Wave

Fifty years ago there were no job classifications for mobile app developers or career paths called data analytic engineers, front-end design engineers, genomic editing engineers or cyber encryption engineers, but now they are some of the most coveted careers and skill sets in the world. In April 2016, more than 1 billion cell-phone users gained the capability to encrypt their IMCD communication with Open Whisper System new encryption protocols.

In the past, organ transplants were considered a limited research endeavor, but technological innovations have transformed the field. Today tens of thousands of human organs are transplanted every year, but the gap between the number of people who need a new organ and the availability factor continues to widen. A few years ago researchers began to focus on two primary directions: stem cells and growing replacements organs in other animals. Both approaches have been fraught with difficulties and slow progress.

In the past, societies of people around the world organized themselves into nations and countries located on various continents of planet earth. Today, technology allows societies to organize on

other matrices; i.e. interest, language, beliefs, passion, expertise, customs, planets, exoplanets, galaxy, etc. This has empowered, promoted, and enabled collaboration globally on ideas and possibilities that in many cases were never thought of before or deemed unnecessary or thought impossible or forbidden based on legal, moral, ethical, cultural, and religious grounds. The Uber launch is an example of this empowerment. In a world and society where people are constantly on the move, how we travel around mega-cities is an important factor. The Uber launch team had to rethink urban transportation models and find a better way for residents in mega-cities to move around, work, and thrive.

And then there's inter-planet and inter-galaxy travel. Since astronomers first discovered planets beyond earth's solar system in early 1996, more than 3,400 exoplanets have been documented. A third example is astronomers are now planning to launch the James Webb Space Telescope in 2018 to determine which exoplanets might be home to extra-terrestrial life. Plans are also being developed for travel to Mars and the next closest galaxy to Mars.

Going Forward

Today, we live in a world driven by mobile apps where people are at least as likely to interact with businesses through an app as in person. Thriving in this environment is no easy feat as it requires delivering quality at high speeds with an enhanced and value-added user experience. Security concerns will continue to be critical, but navigating the ever-changing world of thematic shifts can yield value and customer loyalty. While campuses cannot know with certainty what the future holds, they can develop a vision of key possibilities and challenges relevant for campus

2025 such as the following:
- Cloud-based Internet of Things for center and edge intelligent mobile computing
- Transparency and social media
- Disasters and emergencies
- Dynamic leadership of campus and academic associations
- Social, ethical, religious and moral issues
- VR and AI integration into the curriculum, administration, and institution management
- Cybersecurity of the Internet of Things in 2016 and beyond
- Technology initiatives will increasingly be launched and leveraged as a service
- A world where everything is recorded and every word or suggestion analyzed
- Campus mobile-computing professionals will work directly with researchers, administrators, key management and boards of control to leverage and enhance commodity systems rather than re-invent the wheel.
- Campus technology will gradually shift to a model of service integration with vendors and other external researchers.
- Successful collaboration will transcend institution cultures when testbed projects are successful or fall short of expectations.
- Knowing and understanding your collaborators, customers, peers, detractors and vendors will be key to success.

Finally, on a scale of 1 of 10, how would you rate your campus' culture and ability to develop a campuswide 2025 vision assimilating global emerging trends and technologies?
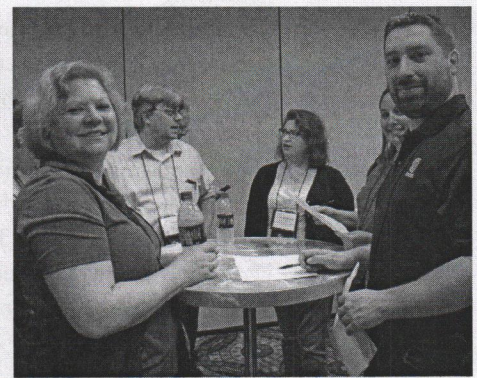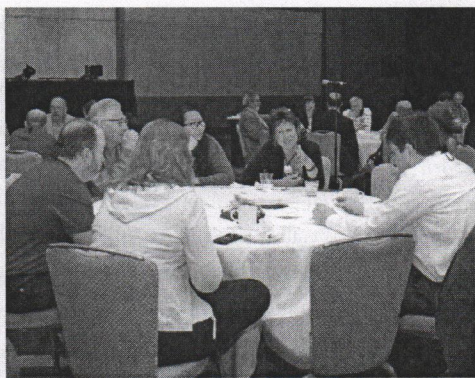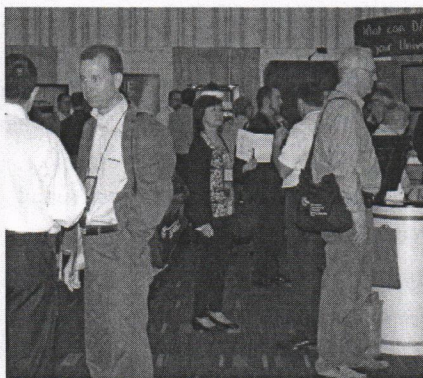
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The Internet of Things, Higher Education, and IT: How Do We Fit In?

IoT will bring changes to your campus

by Matt Arthur

■ The Oxford Online Dictionary says about IoT: "The interconnection via the Internet of computing devices embedded in everyday objects, enabling them to send and receive data."

■ From Wikipedia: "The Internet of things...is the internetworking of physical devices, vehicles (also referred to as "connected devices" and "smart devices"), buildings, and other items—embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data."

■ *An Overview of Privacy and Security Issues in The Internet of Things* by Medaglia and Serbanati postulates that "...the main idea behind the Internet of Things concept is the ability to connect loosely defined smart objects and enable them to interact with other objects, the environment, or more complex and legacy computing devices."

As we all know, all types of gadgets are getting smarter and talking to other gadgets. One interesting way the IoT is reaching the masses, interacting with and even controlling other IoT devices, is through intelligent personal assistants like Alexa, Cortana, Siri, and the plain-jane-named Google Assistant. An example of what this means is the recently announced plan by Carnival Corporation to use IoT as a wearable medallion that will usher in "a new paradigm for guest interactions." This includes no-key access to their staterooms, shipboard people finder, enhanced dining, and interactive gaming experiences and, of course, the ability to buy stuff without credit cards, cash, or any other standard transaction. Cool stuff.

What's This All About?

How does this affect higher education—in particular, those of us in IT supporting higher ed? Is this a repeat of the BYOD surge as more personally-owned computers, phones, game boxes, and DVRs came onto our campuses asking—nea demanding—Internet access? Is this another way for students living on campus to yet again keep us on our toes? Are there real academic and research pursuits here? Just how does IT fit in?

First, let's set some expectations for what I'm about to say. Anytime one starts reading a piece that begins with a Wikipedia definition, one should understand this is most likely not a *scholarly* pursuit. This is the case here. I hope to make us think both individually and collectively, postulate and pontificate just a bit, and maybe even provide a resource that might help you consider how to brace for the wave of IoT heading to a campus near you.

Long ago and far away in the early 2000s, it seemed all of our campus networking folks were vexed by the thought of faculty and staff bringing their own laptops and smart phones onto campus with the expectation that these personal devices would work, at work. Lots of time, energy, and focus was spent on how to make networks available for BYOD without drowning in government regulatory and legislative quicksand. I think we were all thankful to ACUTA's robust and active Leg/Reg Committee that *still* provides us all with updates and sound advice along the way.

Technology and ResNet Support

I spent my early years on campus helping develop the ResNet for our residential students. The struggles were early and often as we thought of ourselves as a technology support group trying to develop good customer service habits. That changed as we began to realize that our students needed support for more than just academic technology.

Where do residential students spend most of their time? In or around their residence halls. As the technology available to our students and their expectations of support changed from basic computer lab access during certain hours to CATV, 24/7 computer clusters with residential computing consultants (RCCs), wi-fi, and smart phones, we had to take a long look at our support model. It was at that sweet spot in time and space that we moved to become a great customer service organization that, yes, also supports technology.

Once we stopped being threatened by new technologies or support for ones that we didn't directly provide; once we decided that allowing our residential students to make the most out of the spaces where they spent the most time; once we stopped trying to dictate and decided to assist, enable, and encourage, that's when the pendulum started to swing our way.

That's also why all of our ResNet support folks quietly laughed at the consternation and concern on the faces of their networking and telecom brethren when BYOD hit the staff and faculty mainstream. It seems to me that the new wave is similar to the old wave, and I'm willing to wager our ResNet friends have been quietly dealing with IoT as a customer support issue while we struggle with it as a technology issue.

Security Is Everywhere

Here at Washington University, we decided early on to use an intrusion detection system watching traffic coming from the residence halls. That way we could spot, note, and work with student computers that were "owned" in an effort to be better net-neighbors. One of my student technicians helped me understand that rather than build a mote to try and keep the bad guys in, it might be better to use the intrusion detection system. It worked so well that our network security office extended those intrusion detection devices to include the entire campus. That and providing extra bandwidth in the evening and weekends gave us bona-fides with our population. Having groups like the ResNet Symposium and ACUTA to bounce ideas to and from was also a big plus.

Along the same lines, IoT started affecting our campus once the laundry machines in the residence halls became Internet accessible. Primarily, this was to allow our students to use their 'Bear Bucks' cards instead of struggling for quarters in order to have clean clothes every few weeks. Soda and candy machines quickly followed. Interestingly, POS (point-of-sale) in the cafés and card access to the residence halls came later.

After the campus shooting at Northern Illinois University in 2008, our administration decided that we would provide security cameras in and around the residence halls. We realized that network-based cameras and DVRs that were on the same networks as our student residence halls might not provide evidentiary-quality video at all times. You know, just when we depended on a video recording, one student might overwhelm the network, and we'd be stuck with little to nothing in the way of digital evidence. So we used spare fiber to create a (mostly) separate physical network that we would call the University Services Network (USN). Over time, that moved to a separate VLAN on the common physical network, with the consistent idea that we needed to segregate these devices for both security and networkability reasons. This was the same thought process that had most campuses moving their student residential networks to separate subnets or even outsourcing them.

Final Thoughts

The IoT has already had an impact on campus life. For us, it broadens the landscape and creates a network of additional things we must consider as we support the faculty, staff, and students. But technology is not a stand-still discipline, and the IoT does open the door to some very cool stuff.

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The Industrial Internet Consortium

The wave of IoT comes to our administrative networks whether we acknowledge or not. It's really just a matter of perception and preparation—most of which we've already done, but just don't realize it. The really interesting thing might just be how our universities participate in research and engineering with IoT. One of the associations that a few of our brethren have become involved with is the Industrial Internet Consortium (www.iiconsortium.org).

From its own website, "The Industrial Internet Consortium is a global, member-supported, organization that promotes the accelerated growth of the Industrial Internet of Things by coordinating ecosystem initiatives to securely connect, control and integrate assets and systems of assets with people, processes and data using common architectures, interoperability and open standards to deliver transformational business and societal outcomes across industries and public infrastructure."

The goals of this consortium are to:

· Drive innovation through the creation of new industry use cases and testbeds for real-world applications

· Define and develop the reference architecture and frameworks necessary for interoperability

· Influence the global development standards process for internet and industrial systems

· Facilitate open forums to share and exchange real-world ideas, practices, lessons, and insights

· Build confidence around new and innovative approaches to security

Again from their website: As the digital and physical worlds collide, organizations need to be able to more easily connect and optimize assets and operations to drive agility across all industrial sectors. The Industrial Internet Consortium was formed to help achieve this goal by identifying the requirements for open interoperability standards and defining common architectures to connect smart devices, machines, people, and processes that will help to accelerate more reliable access to big data and unlock business value. It also focuses on innovation through testbeds.

Universities are built for testbeds. Research, exploration, and creativity are the bedrock on which our institutions are founded. Should we do our best to find common ground with the IIC? There are already a number of our member institutions who are also members of the IIC. It might be something to check out.

In the meantime, I'm sure there are other IoT resources out there. If you know of other groups, associations, or websites that would benefit us all, please send them to me. Maybe we can create a webpage of IoT resources. We always work best when helping each other. That's the ACUTA way!

Institutional Excellence Award
Northeast Community College's Service Center Initiative

Applying for ACUTA's Institutional Excellence Award provides an opportunity to examine a broject you are currently implementing or have recently completed. The process requires that you describe what was done, where, when, by whom, and for what purpose. You identify key goals and objectives, and explain aspects of this undertaking that make it unique and worthy of recognition: Does it promote community outreach? Was a unique partnership formed? Did you obtain creative funding or receive high profile media attention or coverage? It requires considerable thought, winners have told us that the process was a good experience for their campus. ACUTA is always proud to present the descriptions of these outstanding projects.

Northeast Community College redefined its approach to customer service by transforming the IT help desk into a "Service Center" for all college departments to better serve students, faculty, and staff. Customer satisfaction today is a commodity every institution provides. To give customers more, Northeast needed to surprise and delight them. The Service Center concept enables Northeast to mask the complexities of departments, systems, and processes to provide a frictionless customer experience.

The Service Center is similar to an Information Technology Infrastructure Library (ITIL) concept of a service desk, except it serves other service departments in addition to Information Services.

The key institutional goals and objectives of the Service Center include:

1. Serve as an objective for Northeast's Vision 2020 Strategic Goals: Increased Student Success, Increased Student Access, Provide a Globally Competitive Workforce, and Develop and Maximize Resources.
2. Serve as a single point of contact for end-customers and all service departments where applicable.
3. Manage the customer experience.
4. Bridge day-to-day gaps in services, processes, systems, and communications.

Accepting the Institutional Excellence Award for Northeast Community College were Derek Bierman, Carla Streff, and Alex Cook.

5. Provide data and analysis for continuous improvement and institutional strategic decision making.

Creating the Service Center involved a multitude of aspects. The newly formed Technology Services division, a centralizing of all technology departments, needed to be merged with Library Services. The Service Center would take ownership of the library's customer service desk for general responsibilities and allow the librarians to specialize in helping students with research and study. All communication channels for customer contact were dissolved and replaced with one desk, phone number (844-HELP), email address (help@northeast.edu), web portal, and knowledgebase. In addition, Northeast partnered with four other colleges in a Shared Services initiative, another institutional strategic goal, to integrate their versions of a Service Center. Technology employees, administrators, and key department directors from the colleges were all certified in ITIL and/or received various other related training including the "Red Bead Experiment" to give employees the necessary fundamental skills to catch the vision of the Service Center. The Service Center's funding included the reallocation of resources and an infusion of strategic funds.

Planning, Leadership, and Management Support

The Service Center is a key objective of Northeast's Vision 2020 Strategic Plan. The original idea was developed in 2013 as part of a strategic realignment by our president, Dr. Michael Chipps and his cabinet. The initiative was started in 2014 with phase 1 going live that same year.

During realignment planning, the vice president of Technology Services proposed the initial idea brainstormed by his team to solve a student experience frustration of the various silos across campus. The director team posed two questions, "how do we effectively hide or mitigate the process complications, communication gaps, and individual department functions from students so it's easy to work with us? The only thing that should be hard for a student should be their course work;

how do we make 30 departments work like a single unit from the student's perspective?"

With these questions in mind, the directors researched one-stop-shop concepts. These models seemed to serve more as call centers and didn't go far enough to integrate services and processes. What did seem to solve the problem was a concept of Enterprise Service Management, with a "Service Center" binding them together. The Cabinet embraced and built upon the initial idea. The initiative is supported by the entire institution and all vice presidents.

As an outcome of the realignment plan, three phases of the Service Center were composed into an implementation plan. This included merging the library into the Technology Services division, creating four Service Center Specialist positions, hiring up to 12 students as customer service representatives,

other colleges are now implementing the same Service Center concept at their institutions, Northeast is assisting. When all the colleges have their Service Centers implemented, they will be integrated, allowing the colleges to share resources for 24/7 support and sharing incident management among them, just to name a few of the benefits. The Service Center also energizes the other Shared Service objectives such as co-location data centers between the institutions, shared resource sourcing, risk management and security, shared applications, and training to-date.

A cloud-based IT management system (ITSM), ServiceNow, was purchased as the primary tool. The first two phases of this system have been implemented with a client portal soon to be launched. The Service Center is responsible for service catalog management, incident management, problem management,

implementing ITIL within Technology Services and service management training for departments whose request and fulfillment services would be managed by the Service Center. This included partnerships with Financial Aid, Enrollment Management, Facility Services, Communications, Marketing, Educational Services, and several others. Technology operations were reorganized into service departments representing different areas of concern: enterprise, web, network and infrastructure, and risk. Instructional Technology and Technical Support were merged into Client Services.

The Service Center operates within Client Services and manages the request and fulfillment processes, as a service, for the other departments, including the library. A separate institutional strategic plan initiative, Shared Services with other colleges, has supercharged the Service Center initiative. As four

change management, service request management, communication management, and knowledge management. One hundred fifty-eight services along with their processes have been mapped within the ITSM—45 of these services are customer and user facing. All incidents and service requests are tracked. This provides data back for analysis. Although we are still in the infancy stage of analysis, the goal is to present the analysis back to Cabinet for strategic decision making. For example, because all services are tracked by the Service Center, the data can tell us things like: what are the top ten issues for students, staff, and faculty; how long does it take to fulfill a key request, paint a wall, or reset a password; where are the biggest gaps in communication; what areas do we need the most training; etc. Information concerning student's experiences are shared with

Enrollment Management who can use the information for student retention initiatives.

Promotion of Technology and Maturity of Effort

Northeast has historically struggled with technology maturity. It was graded at mostly level 1 of the Capability Maturity Model Integration (CMMI) process maturity model. This began to change when the former president initiated conversations that eventually lead to a consolidation of all technology departments into a single Technology Services Division.

With a new vice president of technology services leading the charge in 2012, Northeast began strategic initiatives to mature operations with a three-year goal to reach at least level three on the CMMI model. At this time, most of these initiatives have been met. Adopting ITIL and Service Management and implementing the Service Center have played a significant role.

One of the biggest challenges to overcome was the negative culture the institution had for technology in general. It had historically been described as "broken" by the majority of the community. The Service Center has played such a significant role in transforming the image of technology, that it was cited by the Higher Learning Commission, during an accreditation visit, as having a significant impact on institution quality measures.

Faculty and staff have indicated that the changes in technology, specifically mentioning the Service Center, have been one of the most successful undertakings of the college within the past five years.

We still have a way to go, but technology operations have significantly improved. Faculty no longer have to become technical support experts. Service Center staff are trained to "swarm" to solve or workaround problems. A faculty member who is having an issue with a projector, simply calls the Service Center. Specialists don't just show up to fix the problem, they come prepared to swap out the projector, cables, laptop, or whatever gets the classroom up and running within minutes. It's recognized by Service Center staff that once a classroom is down for 10 minutes, the class is essentially over. The primary goal is to get operations back up and running, and then fix the problem later.

The initiative began in 2014 after a year of planning. As mentioned previously, the effort was conceived during a realignment initiative as a means to improve processes and to address student experience concerns. The approach was built on many other ideas such as one-stop-shop and ITIL Service Desk concepts. The designers of the plan visited several colleges and researched many concepts. Several consultants in ITIL and Service Management were also engaged to vet the idea whether or not ITIL and Service Management could work across an enterprise.

After three years, we have noticed that Enterprise Service Management has begun to be used to describe a very similar concept in what we've built. We don't take credit for this, but it has energized our efforts to have confirmation on an idea that for all we know, was thought of first at our institution. In some ways, we feel ahead of the curve. We have had speaking engagements as far as Dubai and Bahrain in the Middle East to share the Service Center concept with other college leaders. We could be wrong, but our concept of the Service Center doesn't seem to exist anywhere else in the direction we've taken it.

Quality, Performance, and Productivity Measurements

The Service Center is young and thus young in data, so impact measurements are mostly qualitative. Our Vision 2020 Strategic Plan has been mapped out over five years. We expect to begin producing data shortly and longitudinally by this time next year. Operationally, the data we do have is reviewed and used to make tweaks in processes and service delivery. We have a global SLA defining most of these operational goals. As part of phase III, we will begin mapping out SLAs for all services. It was a strategic decision to put effort in the doing for early wins rather than do all the planning upfront. This agile approach appears to have been a good decision, as many of our objectives have been tweaked considerably.

Cost, Benefit, and Risk Analysis

Direct costs are mostly in personnel and operational funds. Indirect costs are mostly attributed to slowing down other strategic initiatives. Staff had to be trained, plans had to be created, and implementation of something at this scale has somewhat of a bumpy road. The benefits have outweighed most of the risks thus far. The greatest risk was doing nothing. As mentioned by our executive vice president during an email outage, "we can't do anything without technology anymore." Technology isn't a "nice to have," it's a must have or get left behind as an organization.

Northeast's Cabinet, with support from the Board of Governors, decided Northeast would approach technology as a strategic enabler rather than a support service. This is representative of a vice president of technology services who reports directly to the president and is an active Cabinet member. The Service Center gives us information on our current state of operations. Without it, what do we really know about our institution beyond the anecdotal information in our various department silos?

Customer Satisfaction and Results To Date

All departments and divisions were involved with the planning and implementation of the Service Center initiative. The leads of the project met with all directors, students, and various faculty and staff. Surveys were conducted for confirmation

and the information used to gain a measure of the pain with student, staff, and faculty experiences with services.
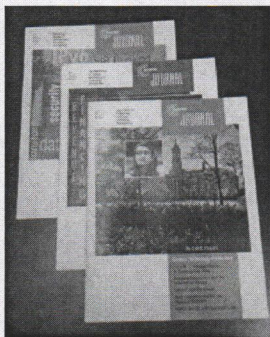
Initial reactions to the Service Center were tentative. Many felt the Service Center was attempting to replace them or take their jobs away. It took some trust and evidence-based convincing that the Service Center would only be taking away the work the departments shouldn't be doing. The Service Center specializes in generalizing. All other departments should be specialists in a particular service. Cross-training within a department is a good thing, but cross training between departments is a bad thing. If cross training is needed, then the activity is a prime candidate for the Service Center to tackle. Does it make sense for an Admissions Office to help students with wireless connectivity? Does it make sense for an advisor to answer a billing question?

We knew the Service Center was becoming a hit when the Registrar staff met with the Service Center to offload their knowledgebase. Our dean of enrollment management sings praises of the Service Center—it just works and makes sense.

Faculty speak out in meetings and gatherings that the Service Center has made a significant difference in the support of students both in and out of the classroom. The qualitative measurements are overwhelmingly positive.

The key challenges have been the ability for staff to absorb and understand ITIL and Service Management. It's much more difficult to implement it than to plan it. Also, the implementation of an ITSM tool has been difficult and time consuming. If you're a CMMI level 1 organization, it's no easy feat to implement either of these. The redesign of 158 processes and services, when information was nothing more than tribal knowledge, takes some time to work through. Without the support of senior leaders, key customers, and two particularly knowledgeable consultants who understood the vision, it wouldn't have been possible to move at the speed we have moved. In addition, without the staff who poured their hearts into the initiative, it would have likely failed at key frustration points.

For more information, contact Derek Bierman, vice president of technology services at derek@northeast.edu.

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