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features

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Volume 31 • Number 6

FM SECURITY AND EFFECTIVENESS

columns
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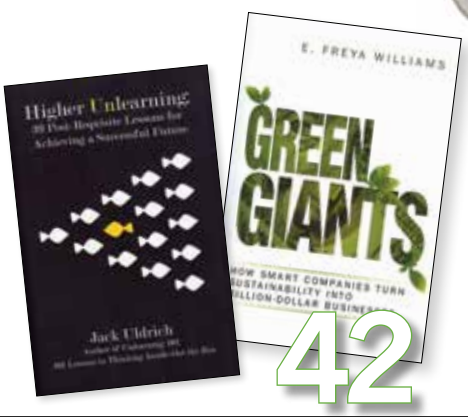

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LONGTIME COLLABORATION WITH PGMS GARNERS GOLD AWARD FOR APPA

I had the distinct honor to represent APPA to receive the 2015 Gold Award presented by the Professional Grounds Management Society (PGMS) at its annual awards dinner on October 23, 2015. I was delighted to receive the award from John Burns of the University of Texas Austin, who just completed his year as PGMS president and has been a longtime APPA and PGMS member.

APPA was selected to receive the PGMS Gold Award "in recognition of outstanding and long-term achievements and contributions to the green industry." But that barely tells the story of APPA's 20-year collaboration with PGMS.

In the mid-1990s APPA and PGMS entered into a strategic partnership agreement, wherein we shared memberships with each other's association offices, attended each other's conferences, and explored ways to share resources and assistance on publications, conferences, and workshops.

When APPA decided to follow up its success of the original *Custodial Staffing Guidelines* publication with similar books focusing on grounds and maintenance, PGMS became a natural partner in the development and co-authorship of the grounds edition, published in 2001.

The 2011 second edition of the *Grounds* book had additional input from PGMS contributors, including editor-in-chief Tom Flood of Elon University, past PGMS president Ellen Newell of Arizona State University, and others.

In addition, PGMS members have developed a powerful Landscape Management and Operations Accreditation program that we highlighted in the March/April 2015 issue of *Facilities Manager*. In 2014 PGMS awarded its first accreditations to the College of Wooster, University of California Davis, and the University of Delaware. At the same awards program at which APPA won the Gold Award, both Georgia Tech and Western Michigan University achieved PGMS accreditation.

These are just a few of the ways in which APPA has collaborated with our colleagues at PGMS, and we plan additional efforts in the future. There are many other associations and organizations with whom APPA collaborates, and plans to collaborate more deeply, as we support the new Strategic Plan 2020. No one person, or one organization, can do it all by themselves. It takes continued and nurtured collaboration that benefits all parties to achieve their goals for their respective members and constituents. APPA looks forward to our continued collaborations with other great associations.

Coming in JAN/FEB 2016

- FM Managed Risk
- Housing Facilities
- 7 FM Practices Costing You
- 2015 APPA Regional Highlights

FACILITIES manager

President
Peter Strazdas, Western Michigan University

Executive Vice President
E. Lander Medlin, *lander@appa.org*

Editor
Steve Glazner, *steve@appa.org*

Managing Editor
Anita Dosik, *anita@appa.org*

Design & Production
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Printing
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Editorial Office
703-542-3837
Fax: 703-542-3782

Advertising
Gerry Van Treeck, 847-347-7851
gvtgvt@earthlink.net

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About APPA
APPA promotes leadership in educational facilities for professionals seeking to build their careers, transform their institutions, and elevate the value and recognition of facilities in education. Founded in 1914, APPA provides members the opportunity to explore trends, issues, and best practices in educational facilities through research, publications, professional development, and credentialing. Formerly the Association of Physical Plant Administrators, APPA is the association of choice for more than 13,000 educational facilities professionals at more than 1,500 learning institutions throughout the United States, Canada, and abroad. For more information, visit us at *www.appa.org*.

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Industry News & Events

facilities digest

By Anita Dosik

APPA 2016 ANNUAL MEETING & EXPOSITION

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Mark your calendar to attend next year's meeting and exposition. You won't want to miss this exciting gathering of fellow facilities professionals and exceptional speakers! Co-located with SRAPPA and TNAPPA 2016.

SCHOLARSHIPS OPEN DOORS TO APPA'S PROFESSIONAL DEVELOPMENT PROGRAMS

Continuing education can be the key to career advancement, but sometimes budgets can get in the way. To help offset the expense, each of APPA's six regions has scholarship programs available to help APPA members advance professionally.

The primary APPA programs for which scholarships are available are the Institute for Facilities Management and the Leadership Academy, both of which are offered twice yearly and have four academic tracks to complete.

Some regions also may offer scholarships for the Supervisor's Toolkit, the CEFP and EFP exam prep and test, or networking opportunities at conferences.

To learn more about the scholarships available in your region, the requirements for application, and application deadlines, visit the APPA website and link to the appropriate region.

APPA 2015 CONFERENCE PHOTOS AVAILABLE ON SHUTTERFLY

You can still access and download electronic images of the APPA 2015 annual conference from our Shutterfly photo albums at *https://appachicago2015.shutterfly.com*. You can also purchase prints and have them shipped to you.

COMING UP: APPA U IN NEW ORLEANS, LOUISIANA

The next APPA U will take place January 17-21, 2016 at the New Orleans Marriott in New Orleans, Louisiana. Combining both the Leadership Academy and the Institute for Facilities Management, APPA U offers a wide array of educational opportunities in a central location twice a year.

At the **APPA Institute**, students select one core area as the focus of their classes at the venue. Morning classes consist of required courses centering on the core area selected. Afternoon classes comprise electives chosen by the student and may be a combination from any of the four core areas.

The **Leadership Academy** has been developed for the educational institution's professionals. It provides opportunities for them to increase their awareness of industry issues, to learn the skills necessary to handle today's changes, and to discover their own leadership potential.

For additional information about APPA U, contact Suzanne Healy at *suzanne@appa.org*.

EVENTS

APPA EVENTS

Dec 6-9, 2015 Women's Leadership Institute, *Amelia Island, FL*

Jan 17-21, 2016 APPA U, *New Orleans, LA*

Feb 21-24, 2016 Supervisor's Toolkit, *Old Dominion University*

Apr 4-5, 2016 Smart and Sustainable Campus Conference, *Inner Harbor, Baltimore, MD*

Jul 11, 2016 EP Summit, *Nashville, TN*

Jul 11, 2016 SFO Summit, *Nashville, TN*

Jul 12-14, 2016 APPA 2016, *Nashville, TN*

For more information or to submit your organization's event, visit *www.appa.org/calendar.*

FREE ACCESS TO THE GREEN REVOLVING INVESTMENT TRACKING SYSTEM (GRITS) FOR ALL APPA MEMBERS

APPA and the Sustainable Endowments Institute (SEI) have launched a new partnership that will provide all APPA members with free access to the Green Revolving Investment Tracking System (GRITS). GRITS is a project-management Web tool that allows users to track and analyze the energy, financial, and carbon savings data from their energy- and resource-efficiency projects, as well as access a library of more than 1,100 projects completed by other GRITS users across the U.S. and Canada. Now, APPA member institutions can access the core features of the GRITS tool at no cost.

This new APPA member discount is not a time-limited trial. Learn more about this tool to help manage the savings data from your energy- and resource-efficiency projects at *http://greenbillion.org/appa/*.

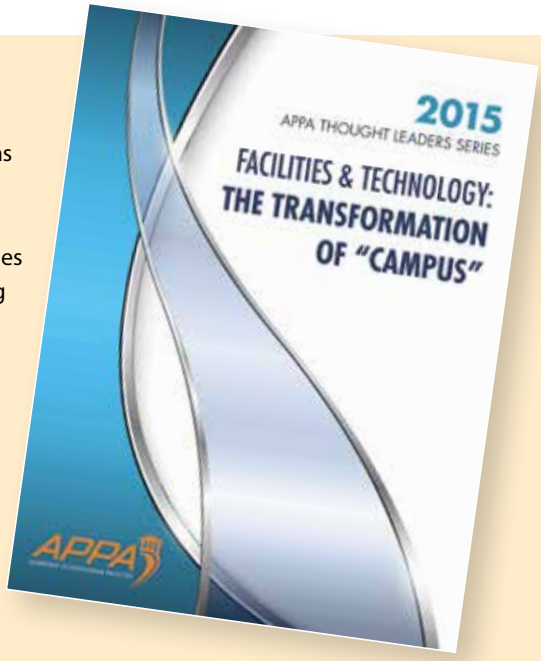
FACILITIES AND TECHNOLOGY: THE TRANSFORMATION OF "CAMPUS"
Newly Released 2015 APPA Thought Leaders Report

The 2015 Thought Leaders report, *Facilities and Technology: The Transformation of "Campus,"* has been published and posted to the APPA bookstore website.

This year the report addresses the factors related to integrating technology and the campus built environment, using technology to enhance critical campus functions, and integrating facilities management and information technology. The report includes a comprehensive section on using technology to enhance key campus functions, a description of the role of technology today, a section on the potential for technology in the future, and a set of questions for institutional dialogue, as well as contextual introduction, a lengthy resource section, and a list of participants.

Be sure to share this with your committees, regions, and other interested parties. There is no charge for the report, thanks to sponsorship assistance from Jacobs, and it is available as a PDF download. APPA has published the first half of the new report in the Sep/Oct issue of *Facilities Manager*, and you can find the second half of the report in this issue.

Thought Leaders is a program of APPA's Center for Facilities Research (CFaR). For more information about the Thought Leaders Series, contact Lander Medlin at *lander@appa.org* or Steve Glazner at *steve@appa.org*.



facilities digest

WHAT DOES "APPA" STAND FOR?

As you can see from the list below, APPA has had several names over its 100 years of existence.

APPA stood for the Association of Physical Plant Administrators from the late 1960s through the early 1990s. Today, the association is known as APPA: Leadership in Educational Facilities, and is most easily recognized and referred to simply as "APPA."

1914: Association of Superintendents of Buildings and Grounds of Universities and Colleges

1948: Association of Physical Plant Administrators of Universities and Colleges

1954: National Association of Physical Plant Administrators of Universities and Colleges (NAPPA)

1969: Association of Physical Plant Administrators of Universities and Colleges (APPA)

1991: APPA: The Association of Higher Education Facilities Officers

2007: APPA: Leadership in Educational Facilities

JOB express

ADVERTISE YOUR POSITION OPENINGS IN JOB EXPRESS

If you are looking for a highly qualified pool of candidates for a facilities management opening, Job Express can help you. Your ad will be posted online where it can be seen by thousands of facilities professionals who access APPA's website.

The Job Express audience consists of professional facilities managers in top executive level positions, individuals who are retiring from the military with extensive facilities and engineering experience, graduates of APPA's Institute for Facilities Management, and members who have earned the certified Educational Facilities Professional (CEFP) credential.

Job Express gives you market exposure through its online postings. All ads appear in one format for one low cost and are hosted online for eight weeks! Add e-mail and website links so that applicants can reach you at the click of a button. To find out more, go to *http://www.appa.org/jobexpress*.

INTERNSHIPS: DID YOU KNOW ...

Internships offer a great way to introduce new professionals to the field of educational facilities management. Interns can bring fresh perspective and up-to-date skills to projects that will help your department while enhancing their portfolio when they are ready to pursue a full-time job. The right intern experience could be the first step for long career in educational facilities management.

APPA's Job Express is a great way to search for and recruit interns for your facilities management department – and it's free! Simply go to the APPA website and click on Job Express for more information on posting your opportunities for an intern to join your team and make a difference!

APPA 1000: TOTAL COST OF OWNERSHIP (TCO) FOR FACILITIES ASSET MANAGEMENT

An ANSI-accredited Standards Developer, APPA recently announced plans to create an ANSI Standard that addresses facilities asset decision making, enabling owners of buildings and facilities assets to accurately project financial expenditures throughout the "cradle to grave" building lifecycle.

The proposed APPA 1000: Total Cost of Ownership (TCO) for Facilities Asset Management, will establish a common framework for owners of facilities assets to identify and more effectively track and manage costs of a facility, building, or supporting infrastructure or assets over the full life cycle, by utilizing TCO principles. The framework would forecast investment needs and simplify data decision requirements by creating and utilizing a standard data set for purposes of maintaining a financially sustainable future for all asset investments.

ANSI Accredited Standards Developer

Interested stakeholders and parties with an interest in participating in the development of APPA 1000 should contact Sam Waymire at *swaymire@appa.org*.

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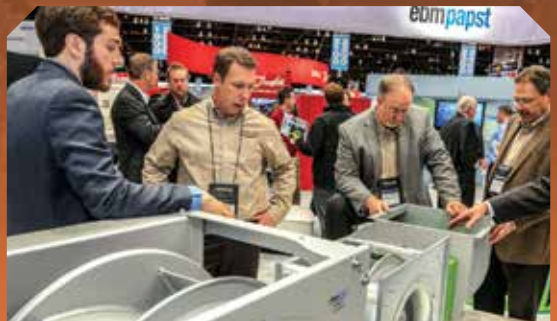

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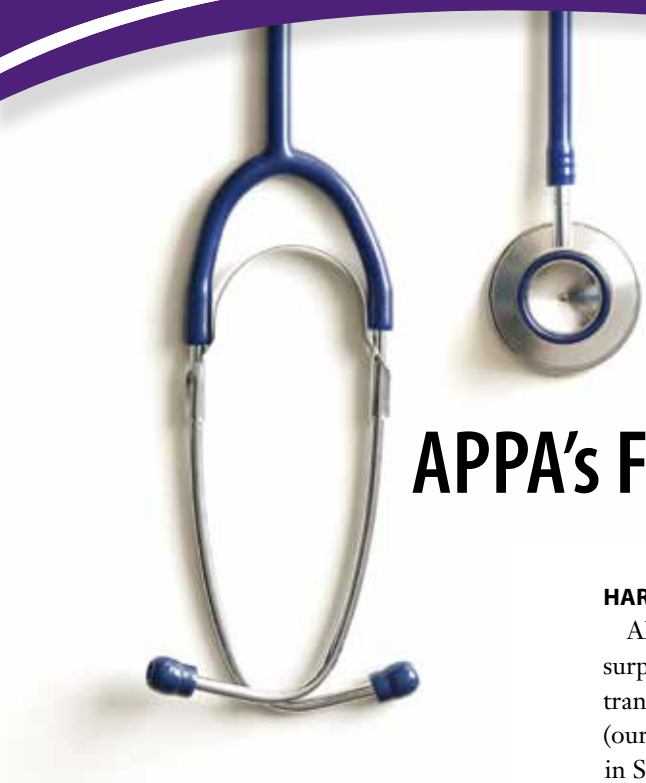


APPA's Financial Health (FY 2014-2015)

By E. Lander Medlin and Jerry Carlson

Our membership should be pleased yet again with APPA's financial health and success to date. This year ending March 31, 2015, APPA posted a surplus of $66,736. The commitment to both our operating and capital reserves remains level at $500,000 (with operating at $400,000 and capital at $100,000). APPA's cash flow balance remains stable and had appreciated to $1.9 million as of this fiscal year-end. In addition, the APPA headquarters building value appreciated slightly with an assessment by the City of Alexandria at approximately $2.4 million as of February 2015. APPA continues to own its headquarters offices outright.

The APPA staff and the Board of Directors understand the continued budget pressures our members face in this challenging economy, given a generally slow economic recovery. Therefore, it remains prudent that we take a conservative approach with our budget while focused on increased value and quality services for our members.

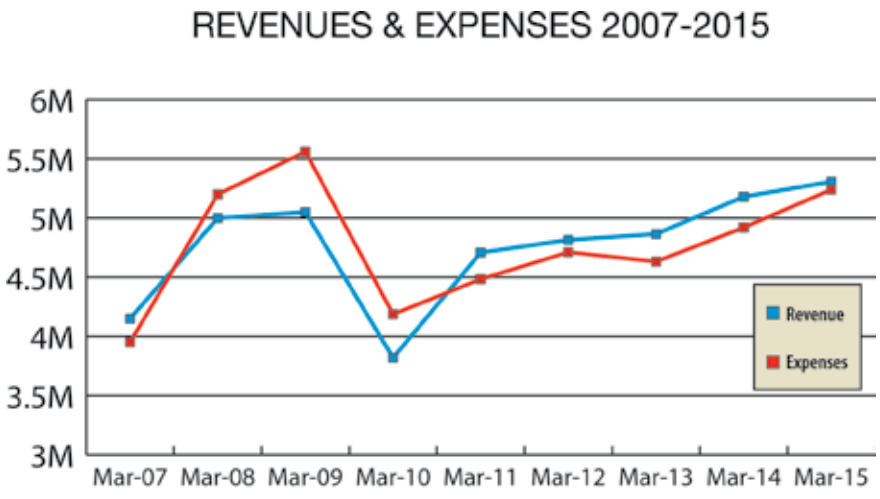
HARD WORK PAYS OFF

APPA experienced this operating surplus given a stellar turnout of registrants for the APPA 2014 Conference (our 100-year anniversary celebration in San Diego, California last July 2014), a significant uptick in FMEP (Facilities Management Evaluation Program) reviews at several institutions, and a good ROI on the regional and/or institutional deliveries of Supervisor's Toolkit and Drive-In Workshops. The regions are really on top of local deliveries and getting grassroots involvement, which we greatly appreciate. Additional revenue from job advertising sales (through Job Express) contributed nicely to this overall surplus. We are certainly continuing to focus on and further recalibrate all programs and their cost of delivery during this present fiscal year (2015-2016) to achieve a balanced budget.

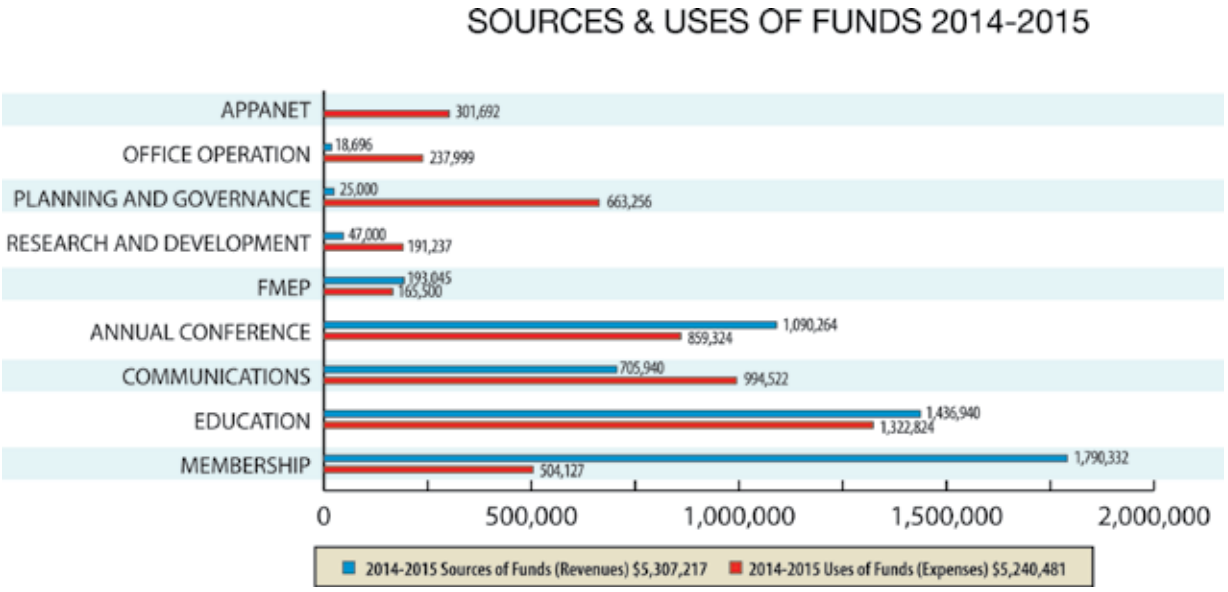
Graph 1 shows a nine-year history of revenues and expenses for APPA. Revenues have grown from our low point after the Great Recession (March 2009-2010) and thankfully have continued to exceed expense levels. However, the cost of doing business continues to climb—an ever-present challenge (as you well know).

Graph 2 shows this past year's revenues and expenses by activity/program. Membership expenses, totaling $504,127, reflect the direct cost only of membership department salaries and benefits, travel and outreach efforts, printing, production, and mailing of promotional materials and other program supplies and

Graph 1



Graph 2



equipment needs for the recruitment and retention of institutional members. However, and most importantly, membership dues also provide significant support for the direct cost of many APPA activities/programs such as the communication department's preparation and delivery of *Facilities Manager* magazine, website and database management, a portion of research and development, overall office operations, and planning and governance. All are important membership benefits and/or related activities and services.

Revenues and expenses are planned and monitored by staff and the APPA Board to achieve APPA's mission to support educational excellence with quality leadership and professional management through education, research, and recognition.

APPA GETS YOU THERE

At this mid-year mark (September 30, 2015), we successfully delivered the APPA 2015 Conference held in the windy city of Chicago, Illinois. Coming off that conference, APPA has embarked on its journey into the next 100 years by significantly updating its 2020 Strategic Plan. The completion of the Strategic Plan provides us the 20/20 vision we need to guide and direct the association toward a successful future that not only meets but exceeds your expectations. Therefore, APPA is looking ahead to the issues and challenges that the educational facilities profession, the built environment, and the education enterprise will face well into the future.

As President Pete Strazdas aptly stated in his awards banquet remarks this past August, "Changes in technology, teaching pedagogy, public funding for education, aging teachers and facility staff, and the way our students think and learn are all things we must keep front-and-center as we design, build, and maintain facility assets. It's our time as facility professionals to earn a seat at the decision table and take a leadership role in aligning facilities with your institution's strategic plans and goals. APPA will help you get there!" As a result, APPA is ramping up its collaborative partnership efforts with other associations and agencies.

VALUE AND AN ENGAGED MEMBERSHIP ASSURES SUCCESS

So that you may more easily (financially and otherwise) engage, every individual at any member institution who would like to be an associate member of APPA may do so just by establishing their own unique user ID and password. It's easy to do. Just go to the membership section of the APPA website and sign up today! We all know that APPA *is* the best value for everyone. However, we need to ensure everyone has access! Institution-wide membership for one flat institutional dues amount is compelling. Now that's value!

The Board and the APPA staff remain committed to delivering excellent programs, products, and services in the most cost-effective manner possible to provide you with the best value for your membership. Our financial health and well-being is only assured by a membership who is truly engaged. Please encourage your colleagues and peer institutions to be engaged in their professional organization.

Lander Medlin is APPA's executive vice president; she can be reached at *lander@appa.org*. Jerry Carlson is APPA's Secretary-Treasurer and director of maintenance services at Butler University, Indianapolis, IN. He can be reached at *gcarlson@butler.edu*.

So How Am I Doing?

By Paul Wuebold

Supervisors are often asked to perform a multitude of evaluation tasks from operations management to equipment operation and replacement to assigned personnel performance. Each one of these evaluations is critical in keeping the team and the mission focused and goal oriented.

THE HUMAN FACTOR

An entire campus is depending on sound decisions based on experience, analytical data, and customer/employee comments. Even minor distractions and unforeseen circumstances can have rippling effects creating larger problems downstream. It is quite easy to get tunnel vision on these challenges as the frequency and importance of the decision become more prevalent, creating opportunities to overlook the obvious at times. It is the evaluation of our employees that is arguably the most critical component of the assessment; we deal with human emotions, pride, image, and promotion opportunities.

Supervisors generally are required to evaluate those assigned under them annually so that individual performance can be measured and communicated to provide opportunities for improvement and recognition of accomplishments.

Each institution has a standard form with which to document performance. The form is the foundation to help us verbally communicate to the employee. This two-way communication offers a shared discussion where words and actions can be clarified. It is more than a snapshot in time, but a culmination of a year's performance showing trends.

A TWO-WAY STREET

Supervisors only receive feedback from the top down, but what about from the bottom up? It can be unnerving and maybe even frightening to ask those whom you evaluate to evaluate you. Sometimes supervisors think they are hitting all the right marks when they are missing more than they are hitting. Leadership styles like Gen. George "Old Blood and Guts" Patton are thankfully from a bygone era and quite honestly have no place in today's educational environment.

Organizations can only be successful if vision is communicated and understood so that those executing the vision can directly contribute to the successful outcome of established goals. The feedback offered by employees can also miss the target. Only fair, unbiased, constructive comments are effective in providing honest evaluations. Anything less would minimize the importance and impact of the assessment. The feedback allows the employee to articulate expectations and performance measures of their supervisors which should generate a more productive work climate and teamwork.

HONEST FEEDBACK

The key to successful evaluations is the focus on job performance. In many cases, supervisors will be able to weed out the over glorious comments from "shop favorites" and the severely disgruntled comments from those looking for "payback." It is the middle part of the survey numbers that provide the most honest and usable feedback. Those comments will have the most impact on performance measurement and any course corrections necessary to improve teamwork, shop climate and mission accomplishment. Everyone appreciates feedback more than a checked box, so written comments and cited examples are extremely important in validating the checked box.

TRUST

Employees need to know that their opinion means something and the time they took to complete the survey is valued. Their voice holds weight and has the potential to create strong and consistent collaborative success and commitment. To ensure honest feedback, demonstrated anonymity must be present. False or misrepresented information, or no information, would likely be the outcome where the employees feel their supervisor would know who wrote specific comments allowing the possibility for retaliation or retribution. It is vital that the trust is never questioned.

As professionals, we all want to know how we are doing. We all have the responsibility for doing the right thing for our teams. Our employees need and want honest feedback on annual performances. Supervisors should have the same expectations.

You can find the sample Employee Feedback Form on the facing page, or on the Professional Affairs page on the APPA website. *http://www.appa.org/committees/professionalaffairs*.

Paul Wuebold is APPA's Vice President for Professional Affairs and senior executive director of facilities and grounds operations at the University of Alabama in Tuscaloosa. He can be reached at *pwuebold@fa.ua.edu*.

Facilities and Grounds Operations
Employee Feedback Survey

Please indicate how well the following statements apply to your immediate boss/supervisor:

STATEMENT	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
COMMUNICATION					
Clearly communicates workplace objectives					
Takes time to listen to me					
Clearly communicates workplace changes or decisions					
Clearly communicates direction for my organization					
I am able to contact Senior Leadership as needed					
I can access the information I need to do my job					
Communicates things that affect me and my job					
MY JOB					
Recognizes good work					
My workload is reasonable					
Knows how my job impacts the department mission					
My supervisor focuses on fixing the problem rather than finding someone to blame					
My supervisor involves me in solving problems that we face					
CONTINUOUS IMPROVEMENT					
I feel encouraged to come up with new and better ways of doing things					
My workgroup looks for ways to improve productivity					
My supervisor is committed to excellence in order to increase customer satisfaction					
I am expected to find better ways to get the job done					
My supervisor expects me to find the root cause of the problem instead of only a temporary solution					
TEAMWORK					
My co-workers and I work well together to accomplish our departments goals					
My supervisor encourages teamwork to accomplish daily objectives					
The people that I work with cooperate to get the work done					
TRAINING/DEVELOPMENT					
I receive the training I need to do my job well					
My performance reviews are fair					
I have the training and support to do a good job					
I feel encouraged to learn new things that will help me do a better job					

Mentoring Comes in Many Forms and From Many Sources

By David Millay

Many past and current APPA members, although our numbers are gradually receding, were born during a period between the mid-1940s and the mid-1960s, a period of time also known as the "baby boomer" generation. Many baby boomers walk among us, and if you are one, you may gain something from this article.

I started thinking about mentoring the other day when I was considering material for this article. Advisor, coach, guide, instructor, teacher, trainer, tutor, or counselor may well be words that describe the mentors many of us have interacted with over the years. So, I dutifully searched the Web, now the undisputed fount of all knowledge. From this fingertip research I gleaned an amazing wealth of information on the subject. I unearthed definitions of the mentoring process such as:

"A process whereby an experienced, highly regarded, empathic person (the mentor) guides another individual (the mentee) in the development and re-examination of his or her own ideas, learning, and personal and professional development. The mentor, who often (but not necessarily always) works in the same organization or field as the mentee, achieves this by listening and talking in confidence to the mentee."

—The Free Dictionary, citation from Segen's Medical Dictionary.

> "MENTORING IS… ABOUT AN ONGOING RELATIONSHIP OF LEARNING, DIALOGUE, AND CHALLENGE."

And:

"A personal developmental relationship in which a more experienced or more knowledgeable person helps to guide a less experienced or less knowledgeable person. However, true mentoring is more than just answering occasional questions or providing ad hoc help. It is about an ongoing relationship of learning, dialogue, and challenge."

—Wikipedia.

And:

"Mentoring is a process for the informal transmission of knowledge, social capital, and the psychosocial support perceived by the recipient as relevant to work, career, or professional development; mentoring entails informal communication, usually face-to-face and during a sustained period of time, between a person who is perceived to have greater relevant knowledge, wisdom, or experience (the mentor) and

a person who is perceived to have less (the protégé)."

—*Wikipedia*.

I'll get to my point in due time, but first I have to share a couple of incidents that caused me to veer sharply from my intended path regarding mentoring.

I was passing by the office of our young and brilliant IT expert Shanna Morris the other day and mentioned to her that I had recently bumped into her significant other, another exceptional individual named Kevin. I asked her what Kevin's last name is and she said, "Fitzgerald." I said, "Oh, like the Edmund Fitzgerald," to which she replied, "Huh?" I said, "You know Gordon Lightfoot's song 'The Wreck of the Edmund Fitzgerald'?" to which she replied, "Who?"

After retreating to my office to consider this exchange, and because I was still officially on my lunch break, I googled YouTube and called up one of my old favorites, "Boogie Woogie Bugle Boy," featuring the Andrews Sisters. Feeling a bit frisky, I walked into the office next to mine, where another brilliant young lady named Shakarie Murphy was dutifully performing her financial duties, and said to her, "Come on, let's jitterbug." To which she replied, "Huh?" I said, "You know, the Andrews Sisters." To which she replied, "Who?"

As I sat back in my office feeling all together aged and out of step, it became clear to me that in order to get back in step, I badly needed someone to help me catch up, someone I could trust, take into confidence, and learn from. Eureka! I needed a mentor, someone who could help me learn and appreciate the e-world we live in today.

So, if you, like me, are a product of the baby boom generation, and you have just a glimmer of understanding of such terms as blogs, going viral, cloud computing, Internet culture, Internet memes, Pinterest, Instagram, Twitter, Facebook, and so on, don't be embarrassed. Just find yourself a good mentor!

David Millay is associate vice chancellor at the University of Arkansas at Little Rock, in Little Rock, AR. He can be reached at *dlmillay@ualr.edu*.

Moving Targets

Leading During Times of Uncertainty

By Joe Whitefield

I have always been fascinated with the concept of dynamics. I remember the challenge of graduating from hitting a baseball off a tee to hitting one being pitched. All of the sudden, physical coordination was not enough—there had to be a sense of timing and depth perception. As soon as I acquired some modest skills to hit a pitched baseball, the pitchers began throwing curve balls. It was as though they didn't want me to hit the ball.

In the physical world, putting things in motion usually makes the task much more difficult. However, given time and practice, people tend to improve their performance as they master the physics that addresses the problems of dynamics.

CHANGE: DYNAMICS IN BUSINESS

Dynamics pose many of the same challenges when they are found in business environments and organizations. We often refer to dynamics in this setting as "change." Although it is true that many things are changing, not all change is positive. Uncertainty—not knowing the future result of current events—is a common byproduct of dramatic or unwanted change in the workplace, and in life. And for many people, uncertainty brings about stress as the feeling of security decreases and, in some situations, fear sets in.

Good leaders respond to change that comes by embracing it and adapting. Beyond that, good leaders respond to uncertainty by focusing on preparation rather than fear. So, let's consider some keys to leading during uncertain times.

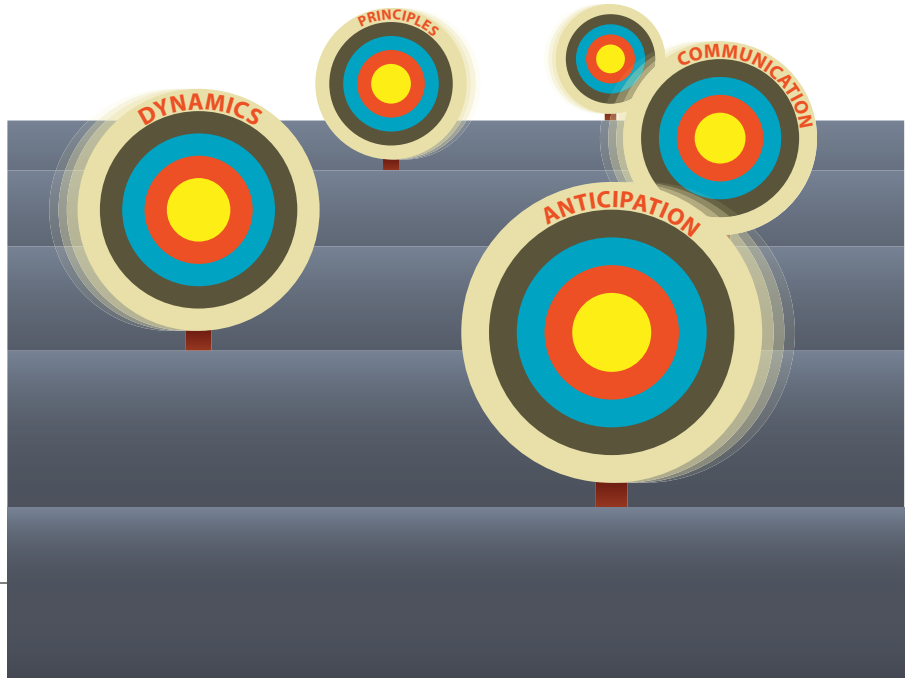
THE PRINCIPLED LEADER

As you start preparing for an uncertain outcome, keep in mind that the inherent problem of dynamics is that everything is moving. Turbulent times call for static principles. One of the great challenges to leadership is the constant pressure to compromise the foundational principles of personal and professional relationships simply to speed up the transition of change. Remember that right is still right, respect is still respect, and honesty is still king. Absent these principles, leading quickly becomes "miss-leading."

A leader who is not trustworthy cannot lead effectively, and uncertain times demand principled leadership. Principles define and display the character of a leader, and they will become to the organization what a lighthouse is to ships on a choppy sea. When everything around an organization is in motion, something must be stable. That something is the principled leader.

ANTICIPATION

Stable leadership does not imply stiff-necked resistance to change in any and all forms. In fact, it is the consistency and reliability of the leader's principles and the organization's values that provide the foundation for positive change and adaptation to occur. One of the great skills that a person or organization can possess in dynamic times is anticipation (anticipation in this sense is the



ability to see something in the present and predict where it will be in the near future). This is a learned skill.

To gauge where something is heading, a good leader will 1) identify who is leading the change and seek to discover the motives and drivers of the change, and 2) study the history of similar events. The better the anticipation and forecasting, the easier it will be for the leader to prepare a proper response. By anticipating an event's probable outcome, a leader can evaluate better paths to success. Proactive change is now a possibility, whereas reactive change is the only option when we simple wait and see what happens.

COMMUNICATION VS. DISCRETION

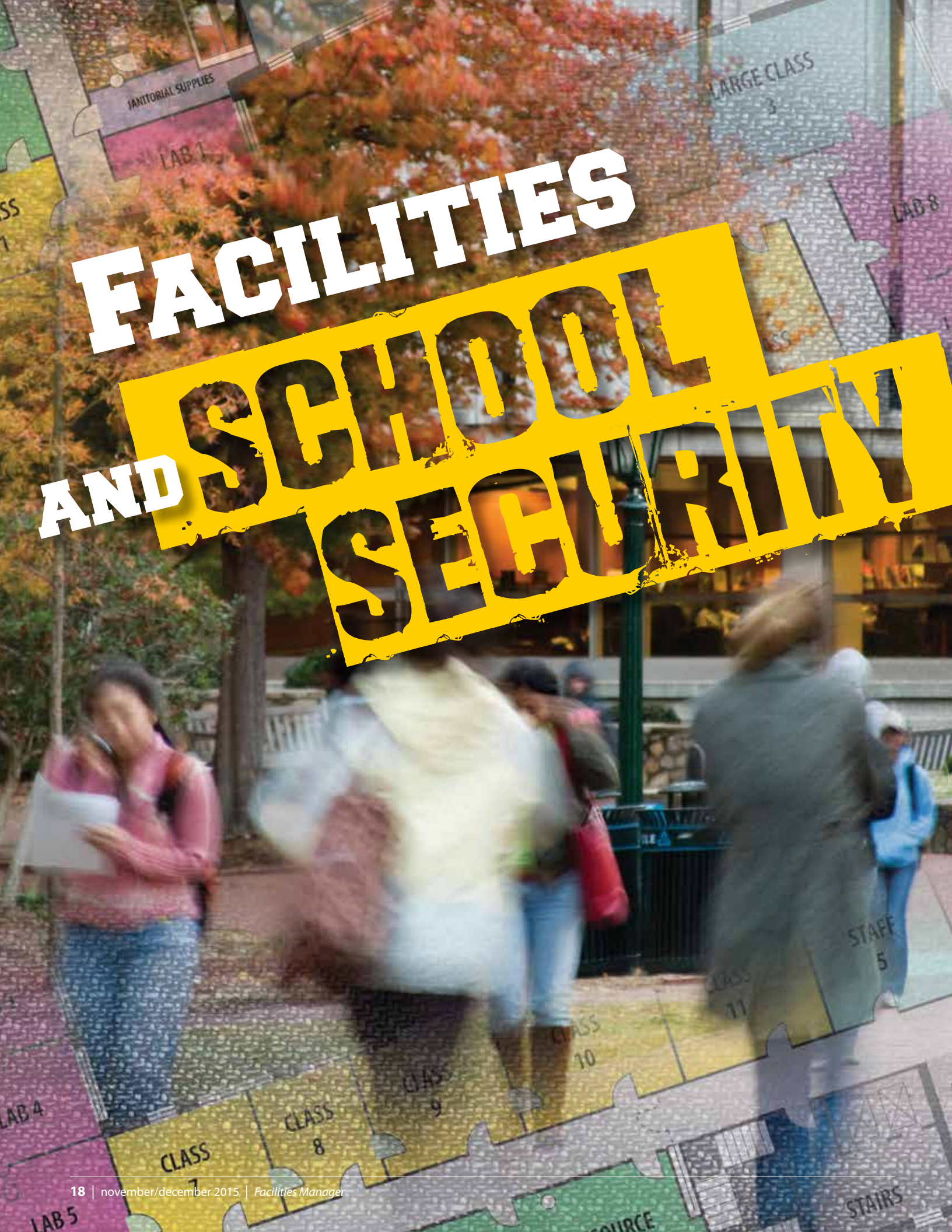
Another key to leading through uncertainty is the communications plan. People want to know what is happening. Tell them. Keep them informed of developments. Get them involved in forecasting activities and in preparing positive responses to likely events. But keep in mind that you may have a unique position that requires being discrete and keeping certain information confidential. These obligations should be kept as well.

This is where a true leader will be tested—in maintaining the right balance between sharing information and maintaining discretion. Once again, integrity and principle-centered leadership are paramount in order be effective at both.

Remember, the primary effort is to share information and guide people in making good decisions. It is difficult to allay other's fears. That's because fear is one part reality and one part perception. When perception and reality are misaligned there can be either a false sense of security, or a false sense of insecurity. A good leader will work to improve security in a real way, and help people notice that they are doing so. That is different, and better than only raising their perception of security, and hoping they don't notice the reality. Communicate facts in lieu of managing feelings and promote productive activities in lieu of giving in to paralysis.

By its very nature, business is dynamic. Today, things appear to be in constant motion and moving faster every day. There are and will always be unknowns with change. Sometimes the change comes with anxiety-causing uncertainty, and those times test the mettle of a leader. By focusing on preparation instead of fear, a principled leader will help his or her organization face the challenges of change, and increase their chances to succeed—and even prosper.

Joe Whitefield is assistant vice president for facilities services at Middle Tennessee State University, Murfreesboro, TN. He can be reached at *joe.whitefield@mtsu.edu.*



FACILITIES AND SCHOOL SECURITY

BY KEITH WOODWARD

THE moment a 17- or 18-year-old freshman arrives on our respective campuses, the expectation of the parents, many of whom are sending their child off to live outside of their home for the first time, is that we in facilities (and our collective collegiate colleagues) are prepared to care for them. Some things are relatively simple, including heat, electricity (lots of it for all of their devices), clean bathrooms, safe beds, working laundry machines, and good study space.

While the tragic events of Umpqua Community College, Virginia Tech, and too many other campuses bring realities that some parents inquire about during open houses, others assume that colleges, universities, and schools are prepared. Lessons learned are readily available on the Web, and most states require colleges and universities to submit plans to the Department of Homeland Security or an equivalent state governing body. The truth is that the majority of educational institutions *are* much better prepared than they were last year or the year before. But is your facilities department better prepared? Stop. It's worth asking again. Is your facilities department prepared?

THE ROLE OF FACILITIES IN AN EMERGENCY

Emergency management plans in higher education are not simply boxes you can check off as done and put them on the shelf. Attendance at one training session three years ago does not mean that you can check the box as "I'm all set." All colleges and universities should have an integrated emergency management plan that facilities departments are both represented in and aware of. Many facilities managers are asking staff to achieve 200-level training on the Federal Emergency Management Agency's National Incident Management System (NIMS). Does the staff under your leadership know what to do?

The facilities department as a business unit was never more evident under the emergency management spotlight than at the opening session at APPA 2015 in Chicago last August. Natalie Hammond (Sandy Hook Elementary), Kristina Anderson (Virginia Tech), and Frank DeAngelis (Columbine High School) spoke for 90 minutes about their experiences when an active shooter showed up at their institutions. Attendees were left with little option but to manage their own emotions upon listening to them recount what were perhaps the most challenging moments of their lives.

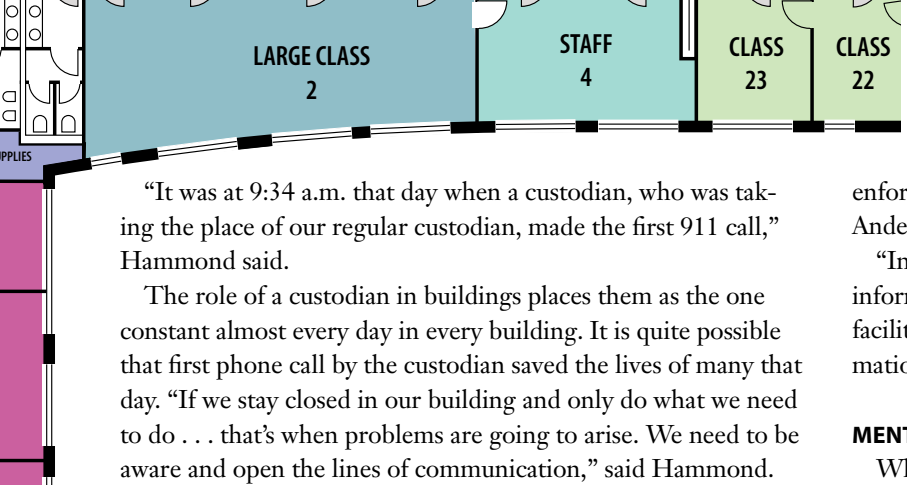
Frank DeAngelis spent more than three decades as principal of Columbine High School, Columbine, Colorado, before retiring in July 2014 from the same position he held on that infamous day of April 20, 1999. He exuded passion for his school in Columbine. Educational institutions were in a different place 16 years ago. Think how far we have come since 1999, when law enforcement officials asked an academic leader to put on a bulletproof vest to help first responders, police, and SWAT teams enter a building to navigate floor plans, shut off the fire alarm system, and find the shooters.

"What happens if you need to shut off the gas valve or ventilation system? What people on your team know what to do? What happens if I wasn't there or my facilities manager wasn't there? Do my assistant principals know what they need to do?" asked DeAngelis. "I think it's so important when you are coming up with these plans that you have the right people sitting at the table. You could have the best laid out plans, but you don't know how people are going to respond during a situation when bullets are being fired." Who from your facilities operations has instant access to floor plans, building alarms, and exits? Are you communicating that to the public safety/security chief?

DeAngelis told conference attendees, "The one piece of advice you need to go back and tell administrators of facilities . . . people often feel if they don't talk about [active shooter situations], it's not going to happen, and that's a disservice [to your institution]." When you hear those words from a man who had a gun pointed at him, it brings a perspective few can challenge.

If an event like this happens on your campus, it is probably not going to be law enforcement that is in the building at the moment when all hell breaks loose. It is, however, extremely likely that a custodian is the one who will be there. "Our custodians that day brought kids to safety time and time again, jumping over pipe bombs," said DeAngelis.

Natalie Hammond explained to the attendees that the primary reason she thinks she is alive today is because she "played dead." As one of the lead teachers at Sandy Hook Elementary School in Newtown, Connecticut, she was the third person shot with an assault rifle in December 2012. After receiving four wounds and crawling on the floor to hide behind an office door, she was fortunate to survive.



"It was at 9:34 a.m. that day when a custodian, who was taking the place of our regular custodian, made the first 911 call," Hammond said.

The role of a custodian in buildings places them as the one constant almost every day in every building. It is quite possible that first phone call by the custodian saved the lives of many that day. "If we stay closed in our building and only do what we need to do . . . that's when problems are going to arise. We need to be aware and open the lines of communication," said Hammond.

Knowing there isn't one solution that is going to solve every situation or occurrence, where can you start in facilities?

"Empowering your employees to be the eyes and ears empowers them as stakeholders of safety. A lot of times we think of public safety. Train those people that own that space—they have the capacity to act and respond," said DeAngelis.

"These events are low frequency, high impact," said **Kristina Anderson**, who was shot three times at Virginia Tech in Blacksburg, Virginia on April 16, 2007. "The emergency management response plan that was in effect that day was two years old and didn't have an active-shooter strategy."

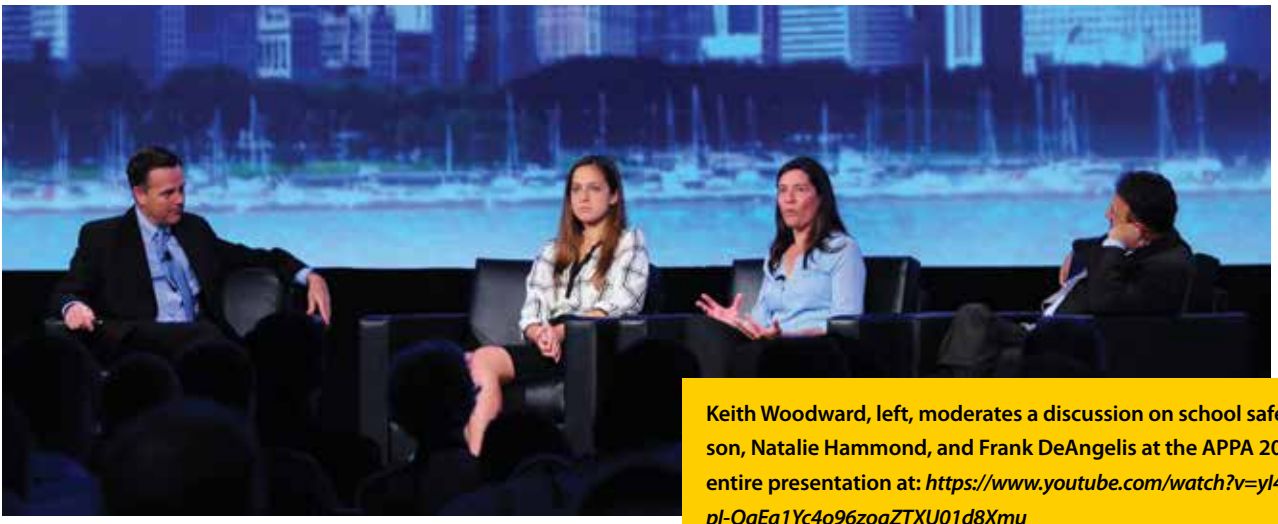
Outsiders understanding your building before an event occurs is also another point stressed by Anderson and Hammond. "Law enforcement has to know the ins and outs of your buildings," Anderson said. "Partner with law enforcement."

"In almost two-thirds of these school shootings, someone has information about these shootings before they occur. Train your facilities staff to be the eyes and the ears and report that information, not only early but often," said Anderson.

MENTAL HEALTH

What Anderson was referring to is the growing mental health issue. According to the 2012 whitepaper, "A Strategic Primer on College Student Mental Health," the Center for Collegiate Mental Health reports that about half of students who use counseling are new to mental and behavioral health services, but about a third of them have ongoing issues. Students who enter postsecondary institutions with diagnosed mental health disorders often have additional challenges with the transition to college or university life.

Mental health is clearly a growing concern. Peter Langman, Ph.D., is an expert on the psychology of school shooters. He describes his website (*www.schoolshooters.info*) as "a compendium of documents relating to a wide range of active-shooter incidents in educational settings. The purpose of this site is to help prevent



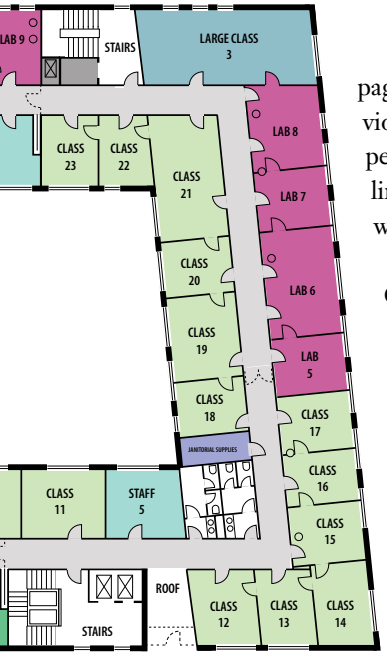
Keith Woodward, left, moderates a discussion on school safety with Kristina Anderson, Natalie Hammond, and Frank DeAngelis at the APPA 2015 conference. View the entire presentation at: *https://www.youtube.com/watch?v=yI4UUeYtWxg&list=PLw8xBpI-OqEa1Yc4o96zoqZTXU01d8Xmu*

school shootings and to provide insight into the perpetrators of large-scale school violence." His latest book, *School Shooters: Understanding High School, College, and Adult Perpetrators*, presents his research on active shooters. He recently discussed what he thinks facilities departments can do.

Langman said communication is obviously a key part of the conversation. "Training employees, and I think facilities employees, are top of the list because they are part of the student environment; they are in spaces where students study, work out, and live," said Langman.

Communication is tricky as well because of the privacy issues surrounding student information. "Facilities employees can look for leakage," said Langman. Leakage is a term used to describe warning signs of potential violence.

"School shootings can be prevented by identifying warning signs in the form of leakage and attack-related behavior. Ram-



page school shooters typically reveal their violent intentions through their talk with peers, their school assignments, their online behavior, and/or their interactions with their parents."

OPENING LINES OF COMMUNICATION

A multiple jurisdictional National Summit on Multiple Casualty Shootings was held by the U.S. Department of Homeland Security, the Federal Law Enforcement Training Center (FLETC); the U.S. Department of Justice, Office of Community Oriented Policing Services; and the Johns Hopkins University School of Education, Division of Public Safety Leadership in late 2012. Its findings are worth reading and can be accessed at *https://www.fletc.gov/sites/default/files/imported_files/publications/summits-on-preventing-multiple-causality-violence/e021311546_MultiCasualty-Violence_v508_05APR13.pdf.*

The report mentions communication as an important factor in dealing with school violence in the "Summary of Summit Recommendations." Recommendation no. 4 asks institutions to "better educate health care practitioners; school administrators, faculty, and staff; and law enforcement professionals about the Health Insurance Portability and Accountability Act (HIPAA), the Family Educational Rights and Privacy Act (FERPA), and the Privacy Act to alleviate misperceptions or perceived barriers to sharing information across disciplines."

There is little question that institutions are struggling with the line between sharing information and the privacy laws at that exist.

APPA is working with the National Fire Protection Association (NFPA) on developing codes dealing with the topic of emergency management. These codes are not imminent, but discussions are happening. In December 2014, NFPA held its School Safety, Codes, and Security Workshop, at which APPA was present. The report was issued in May 2015 and can be accessed at *http://www.nfpa.org/safety-information/for-consumers/occupancies/school-fires/codes-and-security-workshop.*

Some of the questions going into the two-day event included the following:

- What are the practical, code-complying solutions for protecting students/faculty during an active threat scenario involving guns, knives, bombs, and other weapons?
- What challenges face school administrators with regard to implementing building-based (brick-and-mortar) solutions and operational solutions?
- What security technologies/standards exist that need more recognition?

The NFPA report stated, "It will be incumbent on the various organizations that participated in the workshop, as well as other groups likely to be affected by the information in the report, to review and dissect the content. Changes to codes, standards, procedures, policies, and operational tactics are anticipated—likely in the near term. Coordination and cooperation among design professions—architecture, security, fire protection—coupled with input from the various authorities having jurisdiction responsible for ensuring that code provisions are properly applied will be especially important."

TAKEAWAYS

Bad things happen to good people; simply turn on the news to verify that. Facilities departments are not responsible for the mental health of everyone. The code is not going to save facilities from everything. However, you might ask yourself if there are some policies you could initiate right now as best practices that will improve your facilities department's preparedness. For example:

- If you needed to shut down every lock (assume card access locks) in less than 20 seconds, can you do it? Have you practiced it?
- Do you have a kit (with keys/access) ready to go for first responders that give them access to spaces?
- Do you have the mobility of floor plans and equipment so that responders can have access to spaces immediately? If not, does public safety/security?
- Are you checking in with the counseling department? Are there areas in the residence halls that keep creeping up on the radar and mandate your alerting staff?
- When human resources terminates an employee, does facilities know immediately so an employee doesn't let the wrong person into a building or space?
- Do you have an access policy? Who is responsible for assigning access both initially and then with card access or a key?
- Do you have a meeting place for your staff during an incident?

CONCLUSION

At the end of the day it's not about being prepared for every situation—chasing that goal is unrealistic and virtually unattainable. But what facilities professionals can do is be a consistent part of the conversation around issues that affect the wide-ranging complexities of the educational enterprise. In addition, we need to work toward the goal of being prepared when the moment comes, whatever that might entail. The lives of our students and colleagues may depend on it.

Keith Woodward is associate vice president for facilities operations at Quinnipiac University, Hamden, CT. He can be reached at *keithwoodward@quinnipiac.edu.*

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JUST TESTING OR REAL TEAMING

How Advances in Construction Materials Engineering Testing Can Improve Value

By William C. Johnson

With the advent of advanced delivery methods for building projects such as Integrated Project Delivery (IPD) combined with Leadership in Energy and Environmental Design (LEED), the need for more collaborative expert support for the selection and placement of building elements has become much more critical to overall project success.

The American Institute of Architects (AIA) currently defines IPD as "a project delivery method that integrates people, systems, business structures, and practices into a process that collaboratively harnesses the talents and insights of all participants to reduce waste and optimize efficiency through all phases of design, fabrication, and construction." The IPD method contains, at a minimum, all of the following elements: continuous involvement of the owner and key designers and builders from early design through project completion; business interests aligned through shared risk/reward, including financial gain placed at risk that is dependent upon project outcomes; joint project control by owner and key designers and builders; a multiparty agreement or equal interlocking agreements; and limited liability among owner and key designers and builders.

IPD AND A QUALITY OUTCOME

IPD is becoming recognized as one of the most advanced, value-added, and value-producing delivery methods for owners to employ to improve the likelihood of a quality outcome to their major construction projects. In order for this method of design, procurement, and construction to function well, informed decisions on materials selection need to occur early in the process. Properly executed construction materials engineering and testing (CMET) needs to be planned for early in the process to insure that schedules are kept, costs are controlled, and quality is maintained with any deviations identified and corrected in short-term horizons.

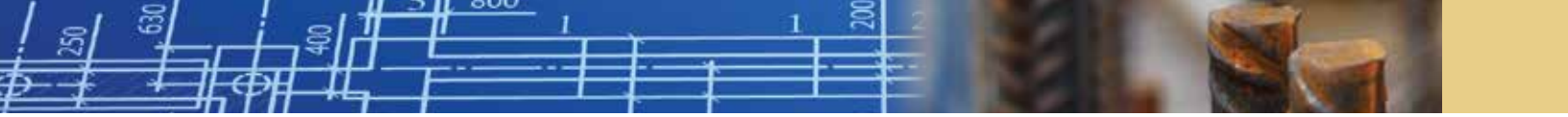
In order to support these advanced delivery methods mere materials testing is not enough. Taking some soil samples for compaction or pouring a few cylinders for concrete testing and "calling it good" is a prescription for missing major benefits associated from integrating advanced materials choice, placement, and testing procedures. By employing these advanced procedures, owners have improved schedule adherence and slashed budgets on major projects.

CASE IN POINT

As a case in point, Tweed Airport in New Haven, Connecticut had a runway project that involved a large quantity of potentially problematic unsuitable soils—dredge materials that were going to have to be removed and replaced in order for a runway expansion project to take place. Rather than remove them, they employed a soil amendment process to modify the soils' characteristics and reuse them rather than replace them. Some of the material was brought to the lab and varying percentages of amendment material were added (in this particular case cement kiln dust), and cylinders were produced of the amended soils and subsequently tested for strength. An admixture was developed that met the required strength and was approved for use by the Federal Aviation Administration and the owner, and a simple site-mixing method was developed to amend the soil in situ as it was placed in prescribed lift quantities.

The results were impressive. The original construction schedule was maintained and the budget was cut by over $1 million. The teaming required to effect this solution far exceeded merely viewing the process as a straight testing solution. Integration with the whole design/construction team in a collaborative manner was fundamental for a successful resolution.

With the advent of LEED as an industry-wide standard for building design and performance, materials need



to be carefully evaluated from both a sustainability and suitability viewpoint. Sourcing materials and fabrication of building components close to the project site, coupled with design and engineering suitability, are all part of the advanced decision-making process necessary for planning and constructing an advanced facility of any type.

Engaging experts who are able to assist the design team in evaluating materials choices and sourcing issues can support the achievement of LEED goals and enhance project outcomes. By teaming with advanced CMET firms, the IPD team may also benefit the construction process by having inspection services at the fabrication sites for components and systems to ensure that materials comply with design requirements prior to being shipped to the site—potentially saving time and money and improving quality. Advanced CMET firms can place steel and concrete inspectors well versed in code and testing requirement at the point of fabrication to evaluate the strength of building materials, welded joints, fill materials, and prestressed panel requirements.

Integrated Project Delivery employs a number of expert systems to speed the process, reduce errors, and improve quality. Building information modeling and other advanced design/visualization processes give the design team new tools to move forward in a collaborative and inclusive manner. Professional CMET firms can support these processes by providing information on materials choices and construction methods, and by providing near-real-time testing results accessible to the team during construction through cutting-edge client document websites.

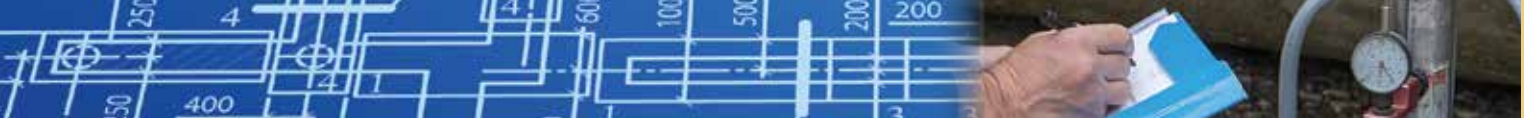
Some CMET firms have expert systems that track the entire materials testing process from start to finish electronically, providing near-real-time results to the IPD team through these continually updated websites. This capability provides the team with information on any deviations and corrections in prescribed performance of materials quickly, so that if adjustments are required they can be affected with minimal disruption to the schedule.

IPD AND LEAN

A number of design firms using IPD techniques are also combining these with Lean practices. Lean is based on the Toyota method of producing everything in the least-waste-way, and is centered on making obvious what adds value to the project and what is clearly waste, then seeking to reduce this waste as effectively as possible. Embracing Lean as the basis for the design/construction process makes near-real-time results and the other features of advanced CMET even more impactful.

Electronic tracking of materials allows the team to track product performance for future projects and to provide a robust history for the owner. It also gives the team the opportunity to work with materials suppliers to affect adjustments to mix quality in near-real-time, a major advantage over most standard processes in which the results come in days later, causing major "do-overs." There have also been instances when members of design teams have had major computer crashes, but by using the client document website format were able to maintain all of their critical testing and reporting information.

As a case in point, the Louisiana State University (LSU) Tiger Stadium project had in excess of 800 piles driven in widely varying ground conditions with refusal limits being reached at a variety of depths. These ground conditions were brought on by the proximity of the project to the Mississippi River, with soft material of various depths overlaying natural stiff material beneath. The issue was that the pile-driving contractor could not predict



where refusal was going to be, so either the piles were too long or in some cases broke during installation. The solution was to live-stream blow counts during installation directly to the engineers who were running pile-driving analysis, so that as the piles were being installed, adjustments could be made in real-time. This advanced field-office-team technology saved time and money and resulted in a more efficient use of field staff.

As another case in point, the City of Charlotte, North Carolina required geotechnical, shear-wave velocity profiling, construction materials testing, and special inspections services for the NASCAR Hall of Fame project. The $107.5 million Hall of Fame began construction in April 2007 and is located adjacent to the Charlotte Convention Center between Brevard, Caldwell, and Second streets. The Hall of Fame project included the construction of an 80,000-square-foot grand ballroom expansion to the Charlotte Convention Center and a 1,000-space parking deck.

Rigorous geotechnical investigations and shear-wave velocity profiling, along with pre-blast surveys and anticipated rock blasting and attenuation studies, were required for the project and for the adjacent NASCAR Plaza office tower, in order to evaluate the subsurface conditions and bedrock profile. The data needed to be shared with the team quickly and accurately. As part of the advanced materials testing process, an electronic deviation log was kept and shared on a continual basis with the whole design and construction team. The use of electronic communications for both the deviation itself and the remedy kept the project on track.

A TEAM EFFORT

Whether it's the NASCAR Hall of Fame, LSU, or the University of Connecticut, owners are demanding that ancillary support services for their major construction projects deliver more value and provide greater levels of collaboration to undergird the efforts of all the players. By engaging with a CMET firm well versed in providing real-time support from conceptual design through opening day, owners have the opportunity to add significant value to their process and their project. It's not just testing—it's teaming that will win the day.

Bill Johnson is the New England client development Manager for Terracon Consultants, Inc., and is based in Manchester, NH. He is an at-large member of the APPA Board of Directors, the coordinator of *Facilities Manager*'s Power Tools column, and a frequent contributor to the magazine. He can be reached at *wjohnson@terracon.com*.

Geographic Information Systems are Solving Complex FM Challenges

By George Dailey and Richard Koochagian, R.A.

Higher education (HE) institutions assume a wide variety of responsibilities that require suitable, productive, and safe environments. You only have to imagine a campus without its facilities—its buildings, grounds, infrastructure, and associated assets—to quickly appreciate their indispensable role in supporting an institution's overall objectives. In short, facilities are mission critical, as are the professionals who manage and protect them.

Although every institution is guided by its own unique mission statement, common themes often include attracting top students, faculty, researchers, and grants to advance innovation and academic excellence; educating and preparing students to become productive contributors to society; and conducting research that addresses the most pressing issues of the day.

Facilities play a vital role in achieving institutional missions. This means that HE facilities management (FM) and public safety professionals must overcome the daily challenges that often hinder the effective planning, managing, improving, and securing of campus property. They also need to improve processes associated with protecting people, buildings, infrastructure, grounds, and assets with limited budgets and resources. These are not small tasks.

This article discusses the current capabilities of FM and public safety technology solutions that are rooted in geographic information systems (GIS), and how GIS can support the life cycles of an institution's facilities.

BREAKING THE STATUS QUO WITH GIS

As with most modern business challenges, innovative technology plays an important role in whether organizations achieve their missions. In the case of FM at educational institutions, a technological "force multiplier" is needed to accelerate and improve the methods by which schools achieve their overall missions.

In general terms, force multipliers are tools that help people amplify their efforts to produce more and improved output. Employing force-multiplying tools means that people using these tools get more work done with the same amount of effort. Unfortunately, the standard array of status quo, stand-alone FM software applications and data silos will be challenged in supporting educational FM professionals as they work to help their schools achieve their objectives.

WHAT IS A GEOGRAPHIC INFORMATION SYSTEM?

A GIS is a versatile and powerful technology platform that organizes information about the world as layers of data linked together by location and geography. It is designed to capture, connect, and manage all forms of geographically referenced information. GIS lets users visualize, analyze, question, and interpret data to better understand relationships, patterns, and trends. GIS is essential to understanding what is happening (and what will happen) in geographic space. Once we understand what's happening, we can better prepare and respond to it.

WHAT IS A FACILITIES GIS?

A facilities GIS brings the visualization, analytical, and reporting power of GIS to facilities managers. It uses location as the organizing principle for creating order out of complex information. By breaking down and connecting data systems and silos, facilities professionals are able to create and amplify desired strategic outcomes like cost savings, growth, profitability, and risk management. As an integrative technology, instead of replacing existing software investments, a facilities GIS works collaboratively with incumbent data and systems like CAD, BIM, EAM, CAFM, CMMS, IWMS, CCTV, access control, scheduling, and a vast array of related applications.

By georeferencing floor plans and other facilities data to their real-world locations, facilities managers gain a more complete and accurate understanding of their portfolios. Facilities GIS can help professionals manage infrastructure both outside and inside buildings, providing a comprehensive means for optimizing space, efficiently moving staff and classrooms, mapping the condition of assets, and ensuring adherence to specific standards and policies.

As a spatial technology, facilities GIS can be used to explore educational institutions across all scales of geography—systems, campuses, buildings, and even specific spaces and assets. In other words, facilities GIS technology is the force multiplier that will help educational facilities professionals overcome the vast array of challenges to the campus built environment.

GIS SUPPORTS HIGHER EDUCATION FM STAKEHOLDERS

There are many stakeholders in HE FM, needing a specific solution in order to perform their tasks effectively. Facilities GIS technology has been developed to help institutions better solve both tactical and strategic challenges throughout the facility life cycle. Because it is a scalable, modular solution, this technology can be implemented in ways that fulfill the requirements of a variety of stakeholder roles. As a result, facilities GIS helps institutions save time and money, protect lives and assets, and create safe and productive environments for students, faculty, and staff—all while increasing the value of existing enterprise systems and data.

HOW DOES GIS SUPPORT CAMPUS FACILITY LIFE CYCLES?

Facilities GIS technology can incorporate nearly any data source, including floor plans from building information models or computer-aided design drawings, infrastructure and linear asset maps, transportation routes, regional demographics, registrar planning data, and weather/hazard information—the possible data sources are nearly limitless.

Facilities GIS software aggregates data from disparate sources into a comprehensive model. This integration provides a holistic view of local, regional, national, or international property portfolios. As a result, users better understand the micro- and macro-level inner workings of their property and thus can effectively address key life-cycle challenges in portfolio management, operations, and safety and security.

PORTFOLIO PLANNING AND MANAGEMENT

Facilities GIS software helps users substantiate critical decisions about facilities and capital investment or divestment that best align with the school or organization's strategic mission. Users can compare indoor floor plans, outdoor site plans, financial data, asset attributes, and demographics—any data that is relevant to planning and managing the campus facilities portfolio.

Curtin University
Perth, Australia

Challenge: **The ability to access systems and data at the time of an incident to help achieve situational awareness was a challenge identified at Curtin University. While a number of existing systems and data were available, such as CCTV and floor plans, these were typically stored in different systems and accessed in different ways. This situation made it difficult to use these systems in an effective and timely manner during an incident.**

Solution: **To resolve this situation, Curtin University turned to a facilities GIS-based security operations system. This solution integrated several existing systems and data to create a centralized view of the campus map—with the ability to drill down to buildings, floors, and rooms. Curtin then integrated the facilities GIS viewer with their CCTV system so that all CCTV camera locations could be accessed from a map. Now university personnel can simply click on a camera and bring up its live video stream. "In the event of an incident, the ability to have clear visibility of the situation without having to run all over campus is paramount to effective safety and security," says Brian Woodman, portfolio manager for technology and systems. "For instance, if harmful chemicals were found, using the facilities GIS we can quickly identify the required buffer zone on campus and in the surrounding areas. With our integrated facility systems, we can also see which departments and rooms will be in that zone so appropriate action can be taken. So it's all about pulling together multiple data sets in a timely manner that are then presented in an easy-to-use interactive map interface to those who are managing the incident response."**

Broward College
Fort Lauderdale, Florida

Challenge: Wayfinding for students, faculty, staff, and visitors across 11 locations in the greater Fort Lauderdale, Florida area.

Solution: Broward College (BC) uses their facilities GIS to provide an interactive map that can be accessed by both desktop computers as well as mobile devices. Campus visitors can search by keywords to find what they are looking for, or simply pan and zoom to find facility locations and information, including a description of the building, directions, and hours of operation. "We needed to provide students real-time, interactive, and accurate information to replace the static maps that were published on the BC website," says Mark Griffin, district director of facilities planning and capital budgets at Broward. "With 68,000 students and new students arriving all the time, we needed a better way to show points of interest at the level of building footprints on our campuses—buildings, parking, food venues, etc. Our facilities GIS has solved the problem. And we hope to expand our implementation in the future to start better tackling challenges around things like space planning and utilization, capital improvement plans, infrastructure mapping, tree and landscape inventory, and emergency management."

Facilities GIS technology can help you evaluate key performance indicators against benchmarks to discover patterns and trends; identify under- and over-utilized facilities to optimize for peak portfolio performance; and evaluate demographic trends to better understand the optimal locations to place new facilities or expand an existing footprint.

OPERATIONS AND MAINTENANCE

The ability to visualize facilities on a map and query associated information empowers facilities managers to find more ways to reduce costs and prolong the life of assets. Facilities GIS brings focus to previously isolated and complex data by letting users visualize it on graphical maps—just as it is seen in the real world. Facilities GIS technology also provides facilities managers the software features necessary to proactively manage and maintain facilities, spaces, assets, and infrastructure to better control property life-cycle costs. Facilities GIS operations and maintenance technology includes solutions for:

- ***Space assignment and utilization:*** Maximize the productive capacity of facilities; edit, allocate, and assign resources and costs to specific areas and departments.
- ***Asset management:*** Establish and maintain asset locations and attributes—both indoors and outdoors—and create workflows for inspections, service requests, and public safety.
- ***Capital planning:*** Conduct comparative map-based historical inventory assessments over time as well as collect, upload, and consolidate condition assessment data to develop capital improvement plans that are based on accurate data.
- ***Energy/sustainability management:*** Easily find and access environmental documents, generate compliance reports on regulatory requirements, and monitor facility environments to analyze trends in indoor environmental quality over time.
- ***Lease management:*** Author, edit, and geo-locate documents associated with real estate leases to improve operations workflows and better manage lease milestones and deadlines.
- ***Move management:*** Efficiently plan and execute moves/adds/changes based on holistic, accurate location-based data.

- ***Compliance management:*** Plan inspections, collect information in the field, and view compliance status across buildings and within to their individual components.
- ***Service request management:*** Securely and efficiently manage maintenance, environmental issues, and health and safety requests.

SAFETY AND SECURITY MANAGEMENT: SECURING AND PROTECTING PEOPLE AND ASSETS

With facilities GIS technology, staff can use graphical maps to accurately visualize locations of people and assets, how they relate to their environment, and whether there are specific emergency response requirements—all critical insights to managing crises and protecting lives and property. Planners and first responders have immediate access to accurate information about who and what is near and inside buildings. Users can generate impact reports, maps, and intelligence packages that help securely convey emergency action plans to management, first responders, and other stakeholders.

The complete whitepaper upon which this article is based is available at *http://penbaysolutions.com/HEpaper*.

Facilities GIS safety and security management technology includes solutions for:

- ***Risk analysis:*** Discover and document risk areas that affect campus property, personnel, students, and assets using tools for inspection, visualization, analysis, and reporting.
- ***Security planning:*** Develop preplanned scenarios addressing identified threats; upload, update, and georeference existing plans; sketch out new plans; update key facility information to fill in data gaps.
- ***Incident response:*** Bring together multiple sources of real-time intelligence with preplan information to support a fast, accurate emergency response in the event of an incident, whether that incident occurs indoors or outdoors.
- ***Security monitoring and access control:*** Analyze building and facility access by role, personnel, and security clearance; identify security alarms; interoperate with lock control and alarm systems.
- ***Event management:*** Whether a political demonstration or a holiday parade, facilities GIS provides a comprehensive, scalable solution to support event planning, coordination, and operations to ensure the safety of attendees and participants as well as the surrounding population and property.
- ***Security monitoring/CCTV:*** Locate, analyze, and access CCTV points and view sheds while gaining interactive visibility to live video streams.

With facilities GIS property management tools for higher education, information about the entire portfolio as well as its buildings, assets, and occupants is accessible over time for each FM function and role. Every user of the system can set their preferred views and reports with equal ease. Every user can choose their data queries, mapping options, and data sets using straightforward menus. The system easily adapts to show authorized users exactly what they need to know in order to do their jobs most effectively.

George Dailey is education administration/operations manager for Esri, Dallas, TX. He can be reached at *gdailey@esri.com*. Richard Koochagian is education practice lead for PenBay Solutions, Topsham, ME. He can be reached at *rkoochagian@penbaysolutions.com*. This is their first article for *Facilities Manager*.

ISO 18480—International Standards for Facility Management

By Theodore J. Weidner, Ph.D., P.E., AIA, CEFP, GGP

Among the many landmark initiatives that the APPA Standards and Codes Council (ASCC) is now engaged in is the development of ISO 18480, International Standards for Facility Management. This is a critically important activity, given that APPA members have worked diligently over decades to build best practices and a vibrant body of knowledge, from which language and concepts are supporting contributions toward creation of an internationally recognized suite of facility management standards. This standards work is being conducted with the ISO Technical Committee 267 (ISO/TC 267)—*Facilities Management*.

The International Standards Organization (ISO) is a source of many standards that may be used in your nation or business. The most recognizable of them is ISO 9000, *Quality Management Systems*. Many firms receive ISO 9000 certification to demonstrate to their clients and customers that they ascribe to a structured process that improves the quality of their products or services for clients. At some institutions you may require certification of designers in an attempt to limit the errors and omissions in design documents. The requirement may also be driven by a desire for "best value" from any vendor.

ISO AND HIGHER EDUCATION

ISO is not limited to standards for quality management—they have many standards that may affect higher education organizations. Two standards that may be familiar are ISO 14000, *Environmental Management Systems*, and ISO 22300, *Societal Security—Business Continuity Management Systems*.

Since 2012, when TC 267 started its work, it has successfully completed drafts of two standards. TC 267 Work Group 1 (WG 1) has a final draft for ISO 18480-1, *Facility Management Part 1 Terms and Definitions*; and a final draft of ISO 18480-2, *Facilities Management—Part 2: Guidance on Strategic Sourcing and the Development of Agreements*, produced by a second Work Group (WG 2). Both final drafts are

awaiting formal review, and approval is expected by ISO within the next year.

Looking forward, the newly established Work Group 3 (WG 3) will develop the *Facilities Management Systems* standard within two years. WG 3 presently has 37 members, including 9 members from the United States. Participants include myself, Brooks Baker (former APPA President and chair, APPA Standards and Codes Council), and APPA Associate Vice President John Bernhards. The working group is chaired by Jim Whittaker, president of Facility Engineering Associates, an APPA Business Partner member.

The Management System Standard (MSS) is essentially the plan-do-check-act (PDCA) cycle for process improvements. The standard will be developed following the ISO format, including introduction and requirements (comprising multiple clauses). In general, the standard will follow according to *plan* (definitions of the organization), *do* (operations), *check* (performance evaluation), and *act* (improvement). The committee members were provided with copies of similar PDCA standards to prepare them at the first WG 3 meeting, held October 9-10 in Denver, Colorado.

CONCEPTS GAIN MOMENTUM

The ISO committee system is similar to many of the standards development organizations in the United States. Committee meetings are hosted periodically by a volunteer country or organization. The concept of management systems standards for various disciplines is gaining momentum within ISO as well as within European standards development bodies, to include the British Standards Institute (BSI).

As with many groups of like-minded individuals, subject matter experts don't always easily agree on definitions when developing an international standard. Among the interesting debates that occurred within TC 267's WG 1 was whether to use the term "facility management" or "facilities management" when describing the profession. As odd as it may sound, the *Terms and Definitions* standard required a number of meetings as well as compromise among all engaged representatives from the many nations in attendance. As a representative of the American National Standards Institute (ANSI) U.S. Delegation to WG 1, which developed the TC267 *Terms and Definitions* standard, I found it frustrating but also fulfilling; we accomplished and learned a lot from our peers and colleagues from around the world.

The WG 2 team, which includes U.S. ANSI delegates Brooks Baker and John Bernhards, made significant progress but was sometimes delayed with the slow-

ness of WG 1. The BSI Standard EN 15221-2, *Facility Management. Guidance on How to Prepare Facility Management Agreements*, identifies key elements to have in any service agreement, including agreements within the organization. The standard addresses such things as definition of the service, risks associated with service delivery, roles and responsibilities of service providers, and measurement of service delivery results.

ISO—FOUNDATION FOR PERFORMANCE AND QUALITY

Development of international standards for facility management has positive implications for APPA members as well as some challenges. Those members who have kept up with APPA educational programs, such as the Annual Conference, Supervisor's Toolkit, APPA U (Institute for Facilities Management and Leadership Academy), or those who have availed themselves of the Facilities Management Evaluation Program (FMEP) or obtained credentials (CEFP), are already well prepared for an international standard. Those facility professionals who feel that the old ways still work will be challenged.

International standards should not be feared. They are the foundation for performance and quality organizations, but they are also voluntary. By way of example, not all businesses are ISO 9000 certified; it is not likely that all facility organizations will seek certification under ISO standards for facility management either, although there is a strong emphasis and interest in Europe to pursue such a certification.

AN EXCITING TIME

Regardless of whether a facility organization becomes certified, these new and developing standards will provide an excellent target and outline for demonstrating the effectiveness of the facility organization. This should be an exciting time for any facility officer because the field of facility management is becoming recognized as an important profession worldwide.

All educational institutions can be certain that they are well represented in this international effort, in large measure thanks to APPA and the growing and important influence of its standards and codes program of work, made possible through its Standards and Codes Council.

Ted Weidner is a member of the APPA Standards and Codes Council, and a professor at Purdue University in West Lafayette, IN. He can be reached at *tjweidne@purdue.edu.*

www.appa.org/standards.cfm

APPA's Regional Reps Collaborate with the I&R Committee

By Michelle Frederick

Last year, APPA's regional representatives began a collaborative partnership with the APPA Information and Research (I&R) Committee. The regional representatives serve as subject matter experts in the review of the content for the Body of Knowledge (BOK). APPA's BOK develops, updates, and disseminates the foundational content required by facilities professionals at colleges, universities, schools, museums, and other nonprofit educational organizations.

MORE ENGAGEMENT

This partnership developed out of the regional representatives' desire to be more engaged as a resource for APPA. Each representative brings a unique set of skills, experiences, and perspectives, as well as a breadth of expertise in all areas of facilities management—on average 20-plus years of experience in facilities management. Who better to help in updating the BOK?

In this new partnership, the regional representatives:

- Identify potential chapter reviewers selected by the content coordinators and set up the reviews as needed.
- Suggest potential subject areas to be covered in BOK.
- Identify potential authors for those subject areas.
- Identify potential content coordinators and assistant content coordinators for the BOK's four core competency areas when a content coordinator is looking for a replacement.

The review process for a chapter is simple, as the review should be brief, concise, and approached as a broad overview. The regional representatives are not expected to write, edit, or update the chapter. Instead, they offer insights into gaps, issues that might have been overlooked, and new and updated technology, methods, or systems that should be established or implemented. Since the partnership began, the regional representatives have completed reviews of "Building Electrical Systems" and "Campus Security," with other chapters currently under review.

> THERE IS ALWAYS WORK TO BE DONE TO KEEP THE BOK UP-TO-DATE AND RELEVANT.

EVERYONE BENEFITS

This partnership has proved to be beneficial in three ways. First, the I&R Committee is able to keep the BOK fresh and relevant in a more timely fashion. Second, the regional representatives have an opportunity to contribute in a new and vital way. Third, the partnership has presented new opportunities for engaging members at institutions to share their own knowledge and expertise.

Even though this initiative comes from the regional representatives, it is also an opportunity for any APPA member to engage. There is always work to be done to keep the BOK up-to-date and relevant. If you are interested in being involved, just contact your regional representative at *www.appa.org/board/board.cfm*.

This partnership promises to be successful in many ways—to the benefit of the regional representatives, the I&R Committee, and to you—the APPA membership.

Michelle Frederick is training and organizational development manager at American University in Washington, DC and senior representative to APPA's Executive Committee. She can be reached at *mfrederi@american.edu*.

Measuring to Help Manage Organizational Culture

By Matt Adams, P.E.

It is not uncommon to find our peers using metrics or key performance indicators to measure the output of service departments and the systems within the same. We measure time, quality, accuracy, efficiency, funding, and more. In fact, APPA's Facilities Performance Indicators report (FPI) lists well over 100 metrics that are readily applied to our operations.

MEASURING CULTURE

Despite this, I have heard of very few institutions that are measuring their workplace culture. This seems odd considering it is one of the most important aspects of our organizations. The famous professor Peter Drucker once said, "Culture eats strategy for breakfast." If you have been to the APPA Leadership Academy you have heard this. His words ring true. It's the culture of our organization that enables, promotes, facilitates, and drives the demonstration of our organizational values.

A manager can drive some behaviors with "carrots and sticks," but that won't last. Properly managed culture keeps the organization performing the actions, routines, and behaviors that demonstrate our values while no leader is present. It is the culture that inspires a team member to make that extra effort, stay another five minutes, or take the time to return a call to a campus customer even though it's already 5:30 p.m.

Given that this aspect of our organizations is so important, why don't more of us actively measure and manage culture? My belief is that it seems too intangible and therefore unmanageable and/or unmeasurable. This is not true, and the private sector is already doing it. I really do believe that anything can be measured when designed properly. This includes culture.

SELECT VALUES WITH CARE

The culture of an organization is defined by a set of values. In the absence of these values being selected proactively, they emerge organically based on a variety of factors that we may or may not condone (a topic for another discussion). Nevertheless, values, like goals or projects, should be selected with care so they are specific and actionable but not too numerous.

Statistically only one to five values can be effectively managed within an organization. These values must apply specifically to our facility operations and not to others in the institution outside our influence. That's not to say that our values may not be shared with others on campus; this strategy is an ideal one when facilitated campus-wide. But values by definition are very difficult to perfect. They are not goals that can be achieved completely within a year or two, but aspirational targets that an organization can always improve upon. So relevance is important. While there are many values with great importance, we ultimately want to reinforce those that improve our organizations.

Say for example that we take the lead on facilities management operations for all residence halls on campus. In alignment with overall campus values, we might come to consensus on the following values that we desire to shape our culture: transparency, customer service, and respect of the individual. To create a system of measurement for culture, we must first define our system of management. We can measure a system by rating short-, medium-, and long-term actions, routines, and examples that define and reinforce our culture.

Starting with transparency, our cultural management plan might initially look like this:

Transparency: A culture of transparency is one without secrets and shares information accurately and openly.

Target: Develop a communication program that informs everyone within our organization in a comprehensive, timely, and interactive manner.

Routines, Actions, and Examples:

1. Develop a standard management report template this quarter that all

managers provide to their staff on a monthly basis.
2. All managers to engage in three or more informal discussions of current departmental events per week with staff other than direct reports.
3. Departmental annual goals and metrics are published in standard template format on the plant department website.
4. Institute an "open door" policy and encourage frequent and open communication.

Naturally this is a brief example for this publication. However, for our purposes, this is enough to demonstrate measurement and management of culture and associated values.

THE BASELINE

Any system of measurement requires an initial baseline measurement (starting point). It also requires a closed system of feedback so that adjustments and additions are made to the routines, actions, and examples based on measurements received.

To create the initial baseline (and then subsequent measurement cycles), we use surveys based primarily on our management system. The measurements should be taken semiannually and anonymously, as job security cannot be perceived to be linked to the survey.

Example survey questions might look like this, using a 1-5 scale where 5 is the best and 1 is the worst:

- Do you believe the department demonstrates transparency and has a program of communications that encourages transparency?
- Do your department heads report to you and your colleagues routinely in an open and clear way?
- Do managers discuss departmental matters with your informally and openly?
- Are you provided access to all departmental goals, targets, initiatives, and metrics?
- Do you feel able to communicate with your manager openly, often, and at your request? Is your manager easily accessible?

One of the secrets of this type of cultural management program is the "example" portion of the Routines, Actions, and Examples. It is critical that managers in particular demonstrate by example the behaviors that embody the desired value. This begins the institutionalizing of the culture.

Matt Adams is president of Adams FM², Atlanta, GA. He can be reached at *matt@adamsfm2.com.*

A Fantastic Week of Learning—APPA U in Scottsdale

By Corey Newman

APPA U, which was recently held in Scottsdale, Arizona, showcased another successful professional development gathering of the Institute for Facilities Management and the Leadership Academy. Colleagues from around the globe were welcomed to learn, network, and collaborate.

We are grateful for the dedicated faculty who make these offerings such a success. A special note of thanks goes to Institute Deans **Mary Vosevich**, **Jay Klingel**, **Lynne Finn,** and **Don Guckert**; and to our Academy Faculty **Glenn Smith**, **Chuck Farnsworth**, **Shawna Rowley**, **Lindsay Wagner**, **Matt Adams**, **Viron Lynch**, **Doug Christensen**, **Ana Thiemer**, **Randy Ledbetter**, and **Lander** and **Ron Medlin**.

Throughout the week, students had opportunities to interact with experts who brought a wealth of knowledge and experience from their varied and extensive backgrounds and provided a rewarding environment for all attendees. Over 400 facilities professionals from across the United States, Canada, Mexico, and Lebanon attended and we welcomed 76 first-time attendees, proving that APPA's popularity in the profession continues to grow!

As the week drew to a close, we celebrated with graduation ceremonies for the class of September 2015 (including 61 new alumni). Thank you to all of the institutional leaders who supported the professional development of their staff! The professional development of any individual must be as customizable as the individuals themselves—and APPA is here to help everyone achieve their personal, organizational, and institutional goals.

Please visit *www.appa.org/training* for more on all of APPA's program offerings.

Corey Newman is APPA's associate director of professional development and can be reached at *corey@appa.org*.

Academy Graduates

PHOTOS BY RHONDA HOLE

Academy Graduates

In alphabetical order; not all graduates are pictured.

Lalit Agarwal, *University of Nebraska - Lincoln*

Michael Anthony, *California State University-Fullerton*

Stephanie Bauer, *Northern Arizona Universit*

Thomas Bauer, *The Salk Institute*

Roger Bizzotto, *University of British Columbia-Okanagan*

Glenn Brubaker, *Alfred State College*

Elizabeth Clark, *Pennsylvania State University*

Franklin Cowherd, *University of Alabama in Huntsville*

Kelly Davis, *Northern Arizona University*

Candi DeBardelaben, *University of Alabama in Huntsville*

Agnes Drogi, *Northern Arizona University*

Kimberly Fuller, *University of Alabama in Huntsville*

Martin Gibb, *University of British Columbia-Okanagan*

Lawrence Griffin, *Loyola University Maryland*

Joe Howell, *University of Alaska Anchorage*

James Lucey, *Smith College*

Lisa Maune, *North Carolina State University*

Barry McHugh, *University of Rochester*

Raymond Mirizzi, *Northern Kentucky University*

Jonathan Peeler, *Ross University School of Veterinary Medicine*

Daniel Seaman, *St. Lawrence University*

David Todd, *University of North Carolina at Asheville*

Terry Willoughby, *University of Alabama in Huntsville*

Thom Wolek, *Florida International University*

Institute graduates next page

Institute Graduates

In alphabetical order; not all graduates are pictured.

Juan Allen, *American University*

Jeffrey Baker, *Northern Kentucky University*

David Billington, *Hillsdale College*

Dale Blevins, *Texas Tech University/Housing*

David Boehm, *University of Illinois*

Eric Boling, *Arkansas State University*

Craig Campbell, *Indiana University-Purdue University/ Fort Wayne*

Kimberly Case-Nichols, *University of Nevada, Las Vegas*

Margaret Chiu, *University of Colorado Boulder*

Michael Coyne, *University of Pennsylvania*

Jolene Deinert, *University of Nebraska - Lincoln*

Brian Flesner, *Doane College*

Robert Fox, *Northern Kentucky University*

Thomas Garza, *Colorado School of Mines*

Steve George, *Indiana University-Purdue University/ Fort Wayne*

Jon Giacomi, *University of California, San Francisco*

Steven Gooch, *University of North Carolina at Chapel Hill*

Marcus Grimes, *University of Texas at Austin*

Daniel Hansen, *Salt Lake Community College*

Jennifer Heckman, *University of Virginia*

Jody Inman, *University of Alaska Anchorage*

Martin Klein, *University of Alaska Fairbanks*

Michael Lane, *Smith College*

Gerri Manley, *Smith College*

David Merchan, *Washington and Lee University*

Vimol Mitchell, *University of Colorado Denver|Anschutz Medical Campus*

Brian Morgan, *University of Michigan-Ann Arbor*

Vincent Natale, *University of Arizona*

Ronald Perttu, *Pennsylvania State University*

Brian Post, *Northampton Community College*

Steven Rames, *South Dakota State University*

Jennifer Root, *University of Texas at Austin*

Paris Rossiter, *George Washington University*

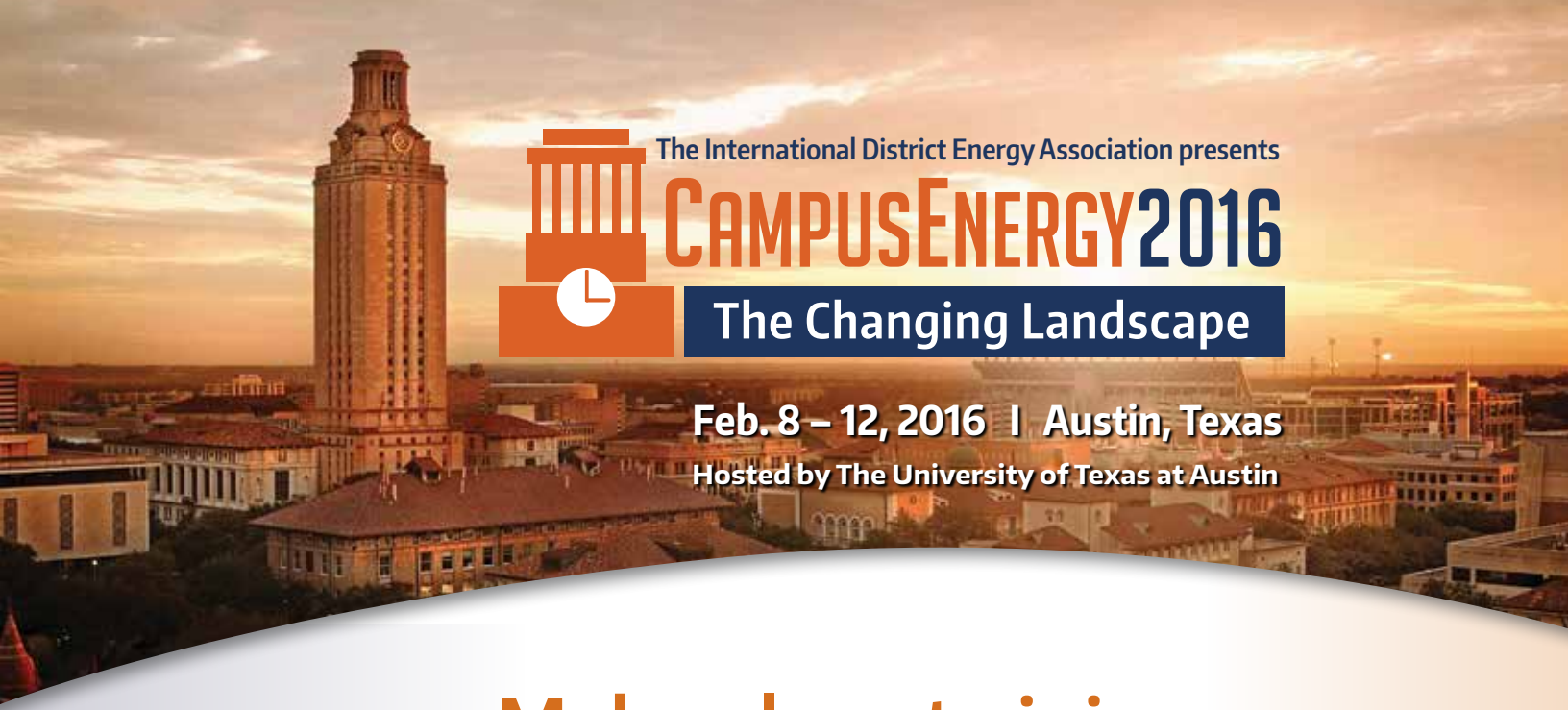
Dana Snyder, *Old Dominion University*

Mark St. Onge, *University of Arizona*

Michele Thomas, *University of Utah*

Anthony Zaino, *University of Arizona*

Institute Graduates



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www.ideacampus2016.org

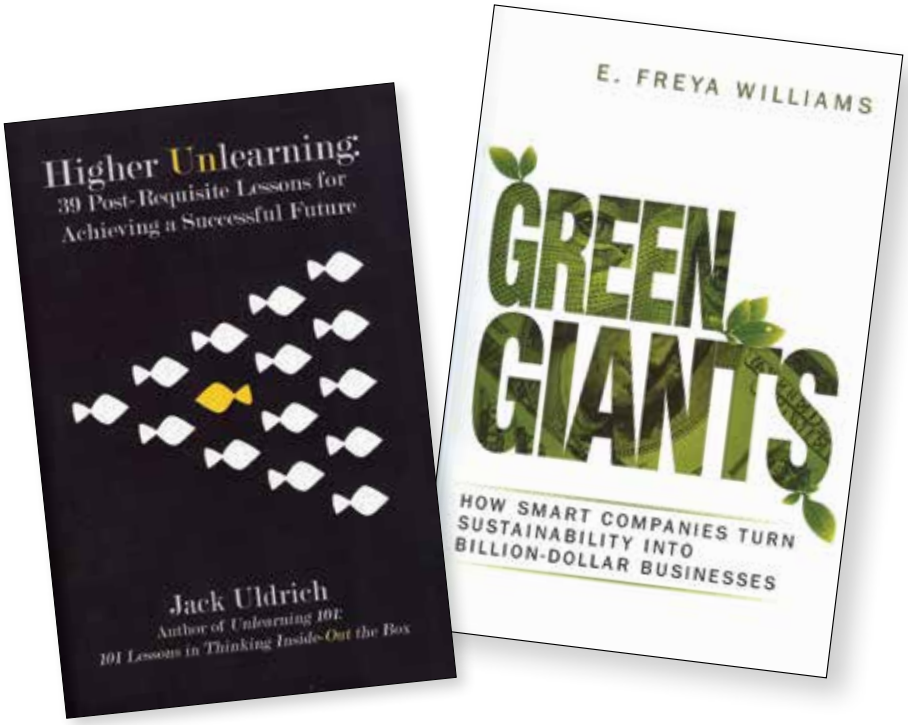
Conference Host University of Texas at Austin *will proudly provide a tour of their award-winning district energy/CHP facility.*

Book Review Editor: Theodore J. Weidner, Ph.D., P.E., CEFP, AIA

Let's wrap up the reading year by looking back at what we might have missed and what we can learn for the future. Here are two books that go together well. One is a quick read; the other is longer but equally valuable as you prepare New Year resolutions either for yourself or your organization.

HIGHER UNLEARNING: 39 POST-REQUISITE LESSONS FOR ACHIEVING A SUCCESSFUL FUTURE

Jack Uldrich, Beaver's Pond Press, Edina, MN, 2011, 144 pp., hardcover $23.95.



For those of you who missed the APPA Annual Conference in Chicago, we had another great closing keynote speaker, Jack Uldrich. It's possible to get a sense of his presentation by purchasing *Higher Unlearning*.

Higher Unlearning seems an unusual choice for organizations supporting colleges and universities. However, it will make sense when you peruse this clearly written, thought-provoking book.

So what is unlearning? The author explains that we gather observations (patterns) through our lives, and those observations help us process future observations and events. An example is the stock market, which recently experienced steep valuation drops. Many people believed in selling stocks as a way to avoid losing principal, thus driving prices down further. Counterintuitively, experts were warning not to sell and to plan on buying. Time will tell if they were correct (in the short term)—perhaps as soon as this review is published. But to get back to the point of unlearning: those experts may have learned to look at other patterns for their recommendations.

A scientific argument for unlearning can be found in mathematics, which tells us that it's possible to interpolate between a set of data points, but that we cannot accurately predict a result outside those data points; engineering formulas used to analyze and design buildings are based on lengthy experiments and safety factors to address this theorem. But many of us don't rely on engineering formulas to make decisions for observations when we believe we have seen the patterns before.

Uldrich presents interesting problems of pattern recognition and misinterpretation. With each problem there is an explanation of the correct answer, and how we allow patterns (or knowledge lore) to interfere with the correct analytical result. Some of these examples are historic: we now understand the correct result, because we have accepted a different set of patterns associated with the problem.

Higher Unlearning is a good read prior to initiating a process improvement project. It can help focus the team to pay attention to data outside the familiar patterns and to develop new—and ideally better—solutions to the process. *Higher Unlearning* should be read cover-to-cover, but can be used for selected examples when needed by the team.

GREEN GIANTS: HOW SMART COMPANIES TURN SUSTAINABILITY INTO BILLION-DOLLAR BUSINESSES

E. Freya Williams, Amacom, New York, 2015, 221 pages, hardcover $27.95, Kindle $17.46.

Normally one involved in a non-profit organization would avoid reading *Green Giants*, but it has particular relevance to many education organizations, particularly those signatories to the ACUPCC (American College & University Presidents' Climate Commitment).

Green Giants is about some large companies that have made a corporate-wide commitment to sustainability, not just "green-washing." But it is also about the elements needed to commit an organization to any initiative intended to transform the organization and to survive the resulting redirection.

The elements are described in five chapters, discussing disruptive innovation, higher purpose, built-in sustainability, mainstream appeal, and a behavioral contract. Although not all companies presented in *Green Giants* are discussed in each of these chapters, there are some good examples of how companies made the commitment to becoming more sustainable and to both survive and thrive as a result.

It's possible to read *Green Giants* while ignoring the sustainability focus and to simply study how these companies maintained or increased their shareholder value. However, that's not why *Green Giants* is meaningful for education facilities. The challenges associated with becoming more sustainable when it is not an organization's primary product are real and formidable.

Green Giants describes the focus and leadership needed to make this transition and to simultaneously address your primary mission. Fundamentally, it's about developing a strategic plan, committing to that plan, measuring the progress of the plan, and valid points to make strategic corrections.

If you're committed to sustainability, *Green Giants* helps identify what works and what may be needed to achieve your goals. If you're not committed to sustainability, it demonstrates how strategic planning and focus can help achieve a difficult goal.

Ted Weidner is an associate professor at Purdue University and consults on facilities management issues primarily for educational organizations. He can be reached at *tjweidne@purdue.edu*. If you would like to write a book review, please contact Ted directly.

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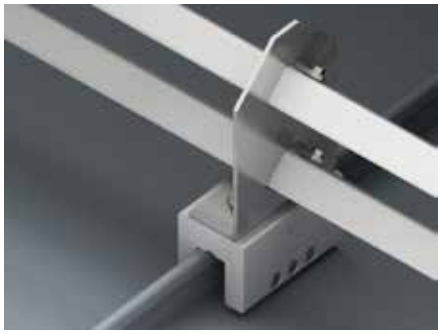

Sno Gem Inc. recently introduced the Gem Series Clamp-To-Seam snow retention systems for standing seam metal roofs. The Gem Series is available in single or double bar retention in 1- and 2-in. bar size. Both clamp-to-seam attachments utilize the MEC bracket, allowing for multiple bar heights and variations to accommodate any snow retention need. The Gem Clamp with MEC bracket is available in a variety of sizes and configurations so it can be attached to most standing seam profiles. The company's patent-pending WaveLock technology, with five points of attachment, provides unparalleled strength. Sno Gem's Silver Bullet set screws include a rounded bullet tip to maximize strength without damaging the paint finish or seam. The Gem Clamp is available with powder coating or a Kynar finish to match the standing seam roof. For additional information please visit Sno Gem at *www.snogem.com*.

Johnson Controls' YORK YD model C dual compressor centrifugal chillers are now available with Optispeed variable speed drives (VSD) and an expanded capacity range of 1,500–6,000 tons (5,300–21,000 kW).

The addition of a unit-mounted low voltage or floor-mounted medium range VSD optimizes the chiller and improves its already outstanding part-load efficiency by as much as 13 percent. In addition, the unit-mounted low voltage VSD nearly doubles the chiller range in several regional markets to meet more facility requirements. At Air Conditioning, Heating and Refrigeration Institute conditions (460 v/60 Hz), the YD model C provides up to 3,000 tons (10,550 kW) of cooling. For more information on Johnson Controls visit *www.johnsoncontrols.com*.

Atlas Copco's new BG245 and BG375 walk-behind trowels excel at finishing concrete in limited-access worksites, and can operate close to walls due to their compact bodies and light weight. The upgraded trowels feature an adjustable clutch to enhance versatility, a maintenance stand to make servicing easy, and a centrifugal clutch for safe operations.

The trowels' relatively light weight and compact protection rings provide superior versatility on concrete slabs. The BG245 weighs 130 lbs. and the BG375 weighs 185 lbs., making them easy to maneuver. Each unit features four blades that range from 23 in. to 37 in. long, which allows operators to tackle a wide range of projects from sidewalks to driveways. For further information on Atlas Copco products visit *www.atlascopco.us*.

BuildingStart, a digital field testing and documentation company, is releasing a free trial of its mobile software in the wake of the recent Legionnaire's disease outbreaks in New York City and Philadelphia. BuildingStart's turnkey software eliminates time-intensive paperwork and the front-end weight of complex asset management systems. Instead, building owners, property managers, and maintenance engineers can use an iPhone, iPad, Android, or Windows mobile device to capture photos, complete checklists, and seamlessly share information with a larger group or organization. Processes are simplified and accelerated, ensuring that users can track problems and better document recurring inspections with cooling towers and other critical building systems, including fire dampers and fire extinguishers. For more information regarding BuildingStart visit *www.BuildingStart.com*.

Schaffner EMC introduces new literature detailing the company's passive harmonic filters for use within a wide variety of industries and settings. High power AC and DC drives for automation tasks, variable frequency drives, and other nonlinear loads draw nonsinusoidal current from the grid, creating harmful harmonics. These ever-present harmonics can manifest themselves in a host of ways—from nuisance issues to catastrophic problems. Our 28-page, full-color brochure details ECOsine Passive Harmonic Filters, which mitigate the harmful effects of harmonics. Copies of the brochure can be downloaded at *www.schaffnerusa.com/downloads*.

Gaia Enterprises' Traction Magic provides immediate tire and foot traction in ice or snow, delivering safety and peace of mind whether you're walking or driving. Made with 100 percent natural earth crystals, this environmentally safe discovery (no salts, chemicals, or dyes) is good for both your well-being and the planet, as it creates traction for cars and pedestrians when on icy roads, driveways, walkways, patios, and sidewalks—literally everywhere your feet or wheels take you. It's also safe, easy, and quick to apply; pet and child safe; and guaranteed to work in all temperatures. Rather than melting ice, these all-natural crystals absorb the liquid layer, then their spiky ends bury themselves into the ice sheet, providing a stable, nonslip surface similar to sandpaper. For more information on Gaia Enterprises products, visit *www.tractionmagic.com*.

New Products listings are provided by the manufacturers and suppliers and selected by the editors for variety and innovation. For more information or to submit a New Products listing, e-mail Gerry Van Treeck at *gvtgvt@earthlink.net*.

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2015

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FACILITIES & TECHNOLOGY: THE TRANSFORMATION OF "CAMPUS"

PART 2

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LEADERSHIP IN EDUCATIONAL FACILITIES

Section II:
Using technology to enhance critical campus functions

Although we think of the campus as a single unit, in fact, it is a composite of many people, spaces, and functions. Part of the challenge of understanding the campus as a whole is that each of these component parts is changing at its own pace. Some campus functions are leaping into the future and embracing technological innovation; others lag behind, held back by technical challenges, daunting costs, or simple discomfort with change.

For the new campus to achieve its potential, disparate campus functions must pull together, confront the challenge of change, and use technology to its fullest potential. For many campus functions, that approach will mean diving into big data. The theme of big data runs through discussions of technological advances across colleges and universities; in almost every campus function discussed subsequently, progress will require the integration and analysis of data stores.

The exciting news is that success in one function can build on the success of another function. Progress stops being linear and starts making exponential leaps. The collective impact of progress in these areas will be greater than the sum of its parts.

The following campus functions each include a description of the Role of Technology Today; a section on the Potential for Technology in the Future; and a set of Questions for Institutional Dialogue.

- Student success
- Instruction and pedagogy
- Research and grant development and support
- Learning environments and course scheduling
- Human resources
- Financial and other administrative systems
- Auxiliary services
- Campus security and mass notification systems
- Energy management
- Building automation
- Space management and master planning
- Environmental, health, and safety management

Student success

Role of technology today. Technology currently plays too limited a role in helping students achieve success. Colleges and universities collect vast quantities of data about their students, but most institutions do not do much with the data that they have gathered.

Some colleges and universities are beginning to harness the potential of this data to support students. For example, Austin Peay State University created its Degree Compass program in 2011 to help students select courses to stay on track for their degree programs. The system takes into account both the course requirements and the talents and needs of individual students and makes individualized recommendations. As well as guiding students, Degree Compass also provides recommendations to academic advisers and also an array of reports to help the institution develop class schedules. (Degree Compass was purchased by education technology company D2L in 2013 and is now a component of the CMS package Brightspace.)

Potential for technology in the future. Participants at the Thought Leaders symposium suggest that the challenges of integration and analysis will be solved. New systems will provide useful information culled from the mountains of student data—information that will be used to create comprehensive strategies for promoting student success. They will also focus on predicting future learning gains rather than simply reporting what has already happened, and smart systems will identify at-risk students early enough to turn around their performance.

Technology will also strengthen long-term relationships between graduates and institutions. The result will be lifelong learning relationships between alumni and their colleges and universities. This approach not only will help graduates fulfill their potential as productive, engaged global citizens but also will allow institutions to draw on the experience and wisdom of their alumni and create bonds of mutual support.

Questions for institutional dialogue

- What data does your college or university collect about students that can provide insights into their success? How accessible is this data?
- What progress has your institution made in integrating student data from different systems? What is getting in the way?
- Are efforts under way to analyze student data? Can you start with systems already in place? For example, does your CMS offer an analytics function?
- Can you make the case for learning analytics and other student success technologies to faculty, staff, and senior institutional leaders?

Data Point: Student success

Taking responsibility for student achievement

"We all know that the responsibility for educating students is not the student's alone. It is a responsibility that belongs to all of us. And we must adapt to meet students' needs in order to graduate more students."

— Dr. Jill Biden, Remarks at SXSWedu 2015, March 10, 2015

Instruction and pedagogy

Role of technology today. The role of technology in teaching and learning is growing every year. Innovative technology has been a driving force in the shifts in pedagogy that have swept across college campuses. Online courses, not to mention online degree programs, could not exist without video streaming, high-speed data access, and CMSs.

Some of these technologies are beginning to mature, while others are still early in their life spans. The campus CMS, for example, has reached near ubiquity just as first-generation systems are showing their age; institutions are turning to new platforms that will enable them to build what EDUCAUSE calls a "learning ecosystem with tools from many sources." EDUCAUSE notes that the old CMS is being replaced with learning management systems that center on the student rather than the course; they will support students throughout their education while providing students, faculty, and administrators with critical information.

Potential for technology in the future. The gap between potential and results will narrow as technology gets easier to use and institutions invest in training and skills development. The learning environment of the next few decades will incorporate technology as a matter of course. The most significant strides in technology for teaching and learning are expected to make interactions more personalized and targeted. Learning management systems will track student engagement and progress and will alert both students and faculty of danger signals. Learning will be measured more frequently—low-stakes assessments will guide instruction and gauge mastery. At the same time, new forms of testing will focus on higher-level cognitive skills such as solving problems and communicating complex ideas.

Questions for institutional dialogue

- How well does your CMS function for today's demands of faculty and students? Can it operate as a learning management system as well as a course management system?
- How deeply is technology integrated into classrooms? Where could integration be deeper and more meaningful?
- What support do faculty members need to gain the skills and understanding required to make full use of technology?

Data Point:
Teaching, learning, and technology

Arizona State University's ambitious adaptive learning program

Arizona State University (ASU) is known for embracing innovation, and it has gone all-in on adaptive learning. Partnering with personalized learning company Knewton, in 2011, ASU moved all of its remedial mathematics courses to a new model that incorporates flipped classrooms, self-paced learning, and in-depth analytics.

Students review mini-lectures and tutorials outside of class, then work through practice problems and challenge tests in class. Students cannot move to a new subject until they have mastered the last. All of their interactions with the system are monitored and reported to the instructor, who can easily see who is falling behind and what concepts they are missing. Students who breeze through the material can take the final examination and complete the course before the semester ends.

Implementing the system was not without problems, but early results seem promising. Knewton claims that pass rates have increased by 18 percent and withdrawal rates have dropped by 56 percent. Nearly half of students finish the course four weeks early. ASU plans to expand adaptive learning to other academic programs, eventually creating an entire adaptive degree program. "We're going to push the envelope," says Philip Regier, dean of ASU Online.

— Information from: Steve Kolowich, "The New Intelligence," Inside Higher Ed, January 25, 2013

Research and grant development and support

Role of technology today. Research would not exist in its current form without technology. As noted by David Lassner, president of the University of Hawaii, research is increasingly interdisciplinary, international, and data driven. Technology enables these shifts, allowing collaboration across departments as easily as across continents and facilitating enormous databases and advanced computation.

Meanwhile, software systems to manage research grants are growing in popularity. These systems promise to reduce the burden of applying for and administering grants by automating budgeting, reporting, and resource allocation. Grant management systems can help researchers demonstrate their effectiveness and productivity and can help institutions support successful researchers.

Potential for technology in the future. Advances in data management technologies and practices will improve data collection and analysis and allow what participants at the Thought Leaders symposium called "one single version of the truth." The vast quantities of data generated by researchers must be managed systematically, with clear institutional policies for storage, ownership, and handling.

Researchers will also take advantage of multiple new technologies on the horizon:

- **Electronic lab notebooks (ELNs),** software-based recording tools, will replace paper lab notebooks. ELN systems will allow for improved backup and data sharing across teams as well as consistent data collection.
- **Science DMZ networks** will enable high-performance data movement and collaboration. A science DMZ network is a subsection of a larger computer network designed specifically for the exchange of large quantities of research data; it sits between the institution's firewall and the World Wide Web. (The term plays on the notion of a demilitarized zone, a place of limited access that lies outside of a secured border.)
- **Advanced networks** will shuttle data between institutions and enable collaboration. These next-generation networks are restricted to researchers and offer blazing connection speeds. They will allow institutions to collaborate in new ways as enormous databases zip around the world.

Questions for institutional dialogue

- How is your college or university supporting collaboration among researchers within the institution, among institutions, and globally? Should investment in collaboration systems be a priority for the institution?
- How are research grants managed in your institution? Has the campus invested in a grant management system or developed one internally? If not, would such a system help support researchers in applying for and administering research funds?
- Does your institution have policies in place for research data management? Who is responsible for research data? What are the costs and benefits of a formal research data management process?

Data Point: Advanced technology for research

New era of collaboration

"We are truly moving into the age of 'global instruments.' One institution might have a facility with a visualization capability, while another has an imaging facility, and a third has medical devices integrated with the environment. Rather than imagining all the research 'core' resources as existing on one campus, we are increasingly sharing research infrastructure with peer institutions in a formal, strategic way."

— Peter M. Siegel, CIO and vice provost for IT services, University of Southern California, in: "Researchers Go Global: Preparing the Next Generation of Innovators," EDUCAUSE Review, *October 27, 2014*

Learning environments and course scheduling

Role of technology today. The challenge of technology in the classroom is that the speed of change outpaces the ability of institutions to keep up with such change. Flipped classrooms, experiential learning, and other new approaches are only a few years old—it is not surprising that colleges and universities are struggling to adapt.

Course scheduling, on the other hand, has been little touched by technology—there is nothing "smart" about the process. Space in higher education is still often controlled at the level of the school or department, which owns offices, classrooms, and labs. Institutions that recognize the value—and the cost—of space are moving toward centralized systems that allocate resources based on the needs and priorities of the institution as a whole.

Potential for technology in the future. Classrooms will continue to become more collaborative and student centered. Participants at the Thought Leaders symposium also predict an evolution of technology that faculty and students use to interact with these learning spaces. Participants envision systems that adapt to different instructors so that the room and the systems within it automatically adjust to each faculty member's preferences.

Advanced systems could play a major role in increasing the utilization of space on campus. Centralized scheduling systems could make the most of the institution's investment in its space while matching classrooms to class sizes and teaching requirements. Thought Leaders participants anticipate a more flexible approach to room allocation that allows faculty members to schedule different classrooms depending on what they are teaching that day.

Questions for institutional dialogue

- How well do your classrooms support new teaching methods? How has your institution prioritized updating learning spaces?
- How are classrooms allocated in your college or university? What efforts are under way to improve the efficiency of space utilization? Where is progress occurring, and what is getting in the way of success?

Human resources

Role of technology today. Technology is essential to the operations of higher education HR departments, but Thought Leaders symposium participants believe that it is not used to its full potential. Many HR systems in place today fit an old model, what John Bersin, an HR expert writing for Forbes, calls "systems of record." These

Data Point:
Learning spaces

Educational value of student-centered classrooms

New research is starting to make the case for the effectiveness of student-centered learning spaces. The University of Minnesota recently undertook a study to compare learning outcomes in two classrooms, one a traditional lecture hall and the other a new space that the university calls an active learning classroom (ALC). These rooms feature large circular tables with lots of space for laptops and other materials. The walls are lined with dry-erase boards. Instructors are provided with a podium in the middle of the room, where they control presentations displayed on numerous video monitors hung on the walls and ceiling.

In the study, the same professor taught the same first-year biology course to two different classes, one in a traditional classroom and one in the ALC. Researchers found that students in the ALC received higher grades than those that their ACT scores predicted, while students in a traditional room received grades nearly identical to those predicted by their ACT scores.

Observations showed that the classroom influenced the instructor to adopt a more engaged teaching style. Despite the professor's attempts to create identical instructional environments in both classes, she behaved quite differently in a traditional lecture hall than she did in the new classroom, where she interacted more with students. Researchers concluded, "When instructors adapted their pedagogical approach to the new space by intentionally incorporating more active, student-centered teaching techniques, student learning improved."

— Information from: J.D. Walaker, D. Christopher Brooks, and Paul Baepler, "Pedagogy and space: empirical results on new learning environments," EDUCAUSE Review, *December 15, 2011*

back-office systems, operated by HR staff, were built to store and manage employee data. New systems are what Bersin calls "systems of engagement." They are used by employees and managers themselves and are designed to help people work better.

The challenges facing HR technology are familiar ones. Data is trapped in silos and not integrated across systems. While the majority of universities (83 percent) have a data warehouse that stores workforce data across their organizations, fewer than half of institutions (44 percent) consistently integrate this data with other systems such as recruiting and performance management systems, according to surveys by Aon Hewitt, reported in its "2012 Higher Education Survey: The State of HR Effectiveness."

Potential for technology in the future. New HR systems and practices will manage the entire talent lifecycle, from workforce planning through recruitment, onboarding (bringing a new employee into the institution), performance management, and retirement and transition. As many routine administrative tasks as possible will be automated or will become the responsibility of employees working through well-designed employee portals. HR experts will deliver value to the institution by improving talent management and providing insights into ways to improve performance.

Questions for institutional dialogue

- Is your HR system a system of record or a system of engagement?
- How well is HR data integrated across systems? What sort of analysis is possible with HR data?
- Does the institution understand the value of integrated advanced HR systems? Can a business case be made for streamlining transactions and improving analysis?

Financial and other administrative systems

Role of technology today. Nearly all colleges and universities have a financial management system in place, although these systems are aging—according to research by ECAR, on average, they are 13 years old. On the

whole, these systems work. They may not be glamorous, but they are operational.

Two factors are challenging these established financial and administrative systems. First, 13 years is old for enterprise software. Many systems are nearing the end of their lifecycles. Second, colleges and universities have recognized the value of the data within these systems. Administrative and financial IT has the potential to be a strategic asset for improving the operation of the institution.

Potential for technology in the future. Next-generation financial systems will provide real value to colleges and universities—increasing efficiency, lowering costs, and improving operational performance. Colleges and universities should take advantage of the opportunity to upgrade new systems as existing systems age.

The greatest potential benefit of new systems lies in analytics. Colleges and universities cannot move to data-driven decision making without access to data and sophisticated tools for analysis. New tools should provide dynamic reporting capabilities that show data in real time. Business intelligence dashboards should display information by using easy-to-grasp visualizations, and users should be able to drill down beyond top-level summaries to explore data in depth.

Questions for institutional dialogue

- How old is your institution's financial system? How well is it operating? How is it integrated with other IT systems? Is replacing the system on the agenda of the college or university?
- What is the business case for investing in a new financial solution with greater analytical capabilities?
- What sort of advanced analytics and business intelligence tools are available to decision-makers in the institutions? Can these capabilities be added to existing systems?

Data Point:
Consolidation of administrative processes

Creation of a single enterprise resource planning system for all Colorado community colleges

In 2004, the Colorado legislature mandated that the 13 community college systems in the state move to a single integrated enterprise resource planning (ERP) system. Previously, each college operated its own customized ERP system, making campus-to-campus comparisons difficult. Institutional policies varied across colleges, and maintaining different software versions required significant IT support.

Technical deployment of the ERP system was complex, requiring a system that could handle transactions from 13 different colleges in a single shared database. However, aligning business processes was harder. Everyone had to agree on points such as the criteria for issuing an incomplete for a course.

The result is a system that provides consistent data for comparison and analysis. The new system has reduced IT support costs and enabled small colleges to have the same functionalities as larger colleges. Most critical, according to Julie Ouska, CIO and vice president of information technologies for the Colorado Community College System, "The standardization of data elements and processes delivers ongoing operational savings in our business functions and enables effective data analysis across the system."

— Information from: Julie Ouska, "Consensus, compromise, and persistence: Implementing a single ERP for 13 colleges," EDUCAUSE Review, *July 14, 2014*

Auxiliary services

Role of technology today. Auxiliary and ancillary services, from housing to dining to bookstores, have faced intense pressure to increase efficiency while adapting to new demands. Many auxiliary services operations have risen to the challenge. Dining, housing, and other services are frequently self-supporting, and may contribute to the campus bottom line. The smart use of technology

has supported these improvements. Systems to manage housing, materials and purchasing, and events have increased productivity and profitability. Driven by retail experiences in the private sector, students will demand similar systems on campus such as shopping carts, real-time account status, learned buying habits, and interfaces with smartphones.

Digital identification (ID) systems have played a big part in these improvements. Many campuses now issue a single smart card or "one card" to each student to access buildings, check out books from the library, take buses, and buy meals. This approach has posed a significant technical challenge that requires interactions among multiple systems with a high degree of security.

Potential for technology in the future. Auxiliary services will continue to focus on improving services while controlling costs. Savvy institutions will make increased use of analytics to assess how customers use campus services and then will target their efforts. The potential for sophisticated data analysis is enormous. For example, residence hall roommates could be matched based on similar traits in the same way that dating services match potential partners.

The most visible technical advances will likely come from innovations in identity cards. Today, most institutions (76 percent, according to Ingersoll Rand) use cards with traditional magnetic stripe technology, but magnetic stripes are notoriously vulnerable to hacking. New systems will use a computer chip embedded in the card. As well as being significantly more secure, chipped cards can be "contactless" so that they can simply be in close proximity to a sensor to work.

Technology is rapidly advancing to the point when students will not need cards at all, only their smartphones. Thought Leaders participants anticipate that smartphone-based systems will only be the beginning. The growth of wearable devices such as the Apple iWatch could usher in an era when sensors recognize individual users the moment they walk by a sensor.

Questions for institutional dialogue

- How have auxiliary services at your institution responded to demand for high services at low cost? What challenges have yet to be solved?
- What is the potential benefit of business intelligence and advanced analytics for auxiliary and ancillary services? Can you make the business case for investing in new systems?
- How does your institution handle access and identity management? Does the campus have plans to move to more secure contactless cards?
- Is smartphone-based identity management on the agenda at your institution? What are the technical challenges that must be solved to implement this approach?
- How can technology enhance the sustainability of auxiliary operations?

Data Point:
Improving campus auxiliary services

Smart social media and campus dining

Boston University (BU) Dining Services has earned a reputation as one of the best users of social media in higher education. The organization's Twitter feed is particularly well managed, engaging students with humor and tact.

When a student posted a plea that one dining hall was out of ketchup, @BUDiningService responded, "We're on it!" Within minutes, the ketchup was refilled. Questions about meal plans are answered carefully and promptly. Fun touches keep students engaged. When one student tweeted that she was craving shrimp cocktail, the staff whipped one up for her.

@BUDiningService is a major commitment for BU and Aramark, its food service provider; social media management is the full-time job of one employee, Aramark's Robert Flynn, and he is committed to keeping up with posts seven days a week, morning and night. "It's a constant thing," Flynn told Boston Magazine. "We're always available for the students, and that's what it's about. If the students are awake, we'll try to be awake with them."

— Information from: Eric Stoller, "#NomNomNom: Social media and campus dining," Inside Higher Ed, *September 4, 2012*

Campus security and mass notification systems

Role of technology today. Technology has proven to be an essential component of security on modern campuses. When a gunman opened fire at the Florida State University Strozier Library in November 2014, police credited the campus security measures with quickly controlling the situation and limiting the number of casualties.

Technology underlies many security best practices. Building access is controlled through ID cards; the best systems know who is in which buildings at all times. Video surveillance systems both provide live feeds and store footage of campus locations. Communications systems allow individuals to report incidents, while mass notification systems alert the campus community of risks.

Potential for technology in the future. Advances in all aspects of security technology promise to improve safety for students, faculty, and staff. For example, institutions are now investing in new video surveillance systems that are connected to the campus network (as opposed to traditional closed-circuit television), allowing security staff members to view video feeds online and quickly share footage with local police forces. Institutions are seeking to strengthen communications systems, recognizing that in an emergency, cellular networks are likely to be jammed with calls.

Mass notification systems are growing more powerful as they become better integrated. Messages can be delivered via multiple systems—text messages as well as automated phone calls, desktop alerts, and even projection screens in classrooms.

Questions for institutional dialogue

- What systems are in place to control access to buildings? If your institution relies on traditional keyed doors, is moving toward carded access a priority? What other systems are available to monitor and control building access?
- Is video surveillance on campus widespread? What sort of remote access is available for both campus and local police?
- How well does the cellular system operate on your campus? In the case of an emergency, would the system quickly overload? What steps can the campus take to ensure that communications will not go down in a crisis?
- How many options are available for mass notification?

Energy management

Role of technology today. Advanced energy management systems have helped colleges and universities get a handle on their energy use. They have helped institutions track their energy consumption with sub-metering systems that enable a fine-grained look at electrical use down to the room level. Innovations in renewable energy have also allowed colleges and universities to start powering their campuses themselves. Higher education serves as a living laboratory for explorations of green energy approaches.

The greatest challenge for most institutions remains the cost required to take advantage of new technology. Most campuses operate with a mix of old and new buildings, building systems, and energy infrastructure. Investments in high-efficiency upgrades must compete with other campus priorities.

Potential of technology in the future. Thought Leaders participants expect that energy management solutions will become less expensive, easier to use, and more automated over the next decade. New systems will provide facilities managers with more data about energy use while integrating with building management and business systems. Future systems will also supply users with data about their energy use along with information on how to cut consumption. Colleges and universities will educate smart consumers, who will make responsible decisions about energy throughout their entire lives.

Thought Leaders participants anticipate that campuses will increasingly become "microgrids"—that is, self-contained energy networks that generate, store, and consume electricity. Microgrids normally connect to the regional electrical grid but can disconnect and operate in "island mode" in the case of power outages. As well as increasing reliability, microgrids will be equipped with the most advanced smart grid technology to provide continuous monitoring of energy consumption and generation.

Questions for institutional dialogue

- How much data about energy use is available to your institution? Can you monitor consumption on the level of academic units? Buildings? Offices? Dorm rooms?
- What strides has your campus made in energy-efficient systems? Where would additional investments pay off for the institution?
- Is your campus generating any of its own energy? Could facilities management develop partnerships with academic units to develop renewable energy projects?
- How can you engage the campus community as an energy conservation champion?

Building automation

Role of technology today. Building automation systems (BASs) are a product of advanced technology. Next-generation building automation is driven both by technological innovations and business factors. Colleges and universities see enormous potential to improve the efficiency of their facilities with smart responsive systems. However, increased functionality has created increasingly complicated systems that are a challenge to operate. Staff members need new skills to understand and maintain advanced automated buildings. Senior facilities officers welcome the new data available but struggle to translate it into actionable intelligence. Analytics tools need to catch up with automation.

Potential for technology in the future. Ease of use, interoperability, and integration will increase as technology improves and vendors respond to facilities managers' needs. New systems will be designed with analytics in mind. The quantity of data will grow, thanks to the Internet of Things, along with solutions for mining that data.

The BAS will be based on open standards rather than proprietary software. Cloud-based platforms will allow plug-and-play integration of the components best suited for individual institutions. Self-diagnosing and self-healing systems will assess their own status, correct problems when possible, and notify the staff when service is required. The role of the facilities manager will be as much to supervise systems as to supervise staff.

Data Point: Energy management

Development of a microgrid at University of California San Diego

The University of California San Diego (UCSD) is pointing the way for colleges and universities seeking to optimize energy use. The campus operates a sophisticated microgrid that generates 92 percent of the electricity used by the campus of 45,000 people, 450 buildings, and nearly 2,000 acres. Power is produced in a cogeneration plant, via a fuel cell (at 2.8 megawatts, the largest such cell on any campus), and through solar panels. Excess energy is stored in a variety of systems, including batteries and a thermal energy storage system. Energy use is constantly analyzed via a system known as the UCSD Master Controller, which integrates power system analytics and optimization software that plans and schedules generation, storage, building management systems, and demand load.

While focusing on reliability for the campus, UCSD also operates its microgrid as a lab to test energy innovations. For example, it recently installed a shipping container housing worn-out electric vehicle batteries; no longer able to operate cars, they can still hold enough charge to store energy for the microgrid. If it works, the system could provide a second life for the batteries and reduce waste.

— Information from: Power Analytics, "ESDA, UC San Diego, and Viridity Energy unveil new generation smart grid at California Higher Education Sustainability Conference," press release, June 21, 2010

Questions for institutional dialogue

- What data does your BAS provide to your facilities operation? How can you make use of this data to improve efficiency and advance the strategic goals of the institution?
- How closely integrated are the buildings, building information systems, and building automation systems on your campus? Can you get a comprehensive view of the campus and how it is functioning? What components of a fully integrated system are missing, and can you move toward adding them?
- What skill sets and training are needed to support the gathering of the best information possible from the BAS?

Space management and master planning

Role of technology today. Higher education campuses are planned, designed, constructed, and managed, with technology playing a role every step of the way. Colleges and universities have assembled toolkits that incorporate geographic information, building information modeling, and facilities information management systems. While powerful, these systems have their limitations. Greater integration would greatly increase their impact. Systems are often highly technical, and translating the data they contain into information that makes sense to a general audience is challenging.

As a result, master planning is often perceived as an exercise that contributes little to the real world. That perception is a missed opportunity. Master plans should be living, breathing documents that inform both long-term visions for the campus and day-to-day use of buildings and grounds. Technology does not yet empower campus planners and facilities managers to fulfill the potential of the master plan.

Potential for technology in the future. Thought Leaders participants believe that master plans can become more powerful and dynamic through technological innovations. They imagine being able to show administrators how different options would shape the campus. All sorts of scenarios could be played out in real time—for example, changing traffic patterns, adding new classroom buildings, and increasing enrollment.

Such a system is still in the future, but it would build on the technology now under development. New space management systems will consolidate data into a single integrated system. Straightforward metrics will draw clear lines between the institutional priorities and the facilities operations and plans. Predictive analytics will assess the impact of proposed changes to the built environment. Most powerfully, improvements in space management and information systems will take the master plan off the shelf and into the real world. Plans can become dynamic documents that are adapted as needs shift.

Questions for institutional dialogue

- What tools are available to your institution today to plan and manage space on campus? How closely integrated are these systems? What advances in technology could benefit these functions?
- How clear is the connection between the campus planning and facilities management function and the institutional mission and vision? How can you make these links clearer to stakeholders and institutional leaders?
- How old is your campus master plan? How often is it consulted when making decisions about the campus? What steps would be necessary to make the master plan a dynamic resource?

Data Point: Master planning

Importance of data-driven decision making

"Institutions who know their value to society can show it through measurable outcomes. … Using sophisticated data analysis and tools for decision-making steps up the level of sophistication that university partners are able to add to the process, whether it be programming, construction, allocation of space, etc.; it is used to assess current environmental impact, set institutional goals, and measure performance."

— Society for College and University Planning (SCUP) Academy Council, "Report on Trends in Higher Education Planning 2014," 2014

Environmental health and safety management

Role of technology today. The potential of technology in environmental health and safety (EHS) management in higher education has yet to be fulfilled. Certainly technology is essential to EHS management today. Colleges and universities rely on reports, databases, and spreadsheets for record keeping and compliance. However, few institutions have invested in specialized software to improve the management of EHS functions, according to Matthew Littlefield, the president of consulting firm LNS Research, in a recent article on environmental health and safety. Littlefield says that in addition to failing to use specialized systems, institutions rarely integrate EHS data with other campus information systems. The result is an island of data that fails to bring added value to the institution.

Potential for technology in the future. Smart use of technology has the potential to elevate EHS activities from simply a compliance function to a more integrated and integral role on campus. By automating routine tasks and integrating data from across the institution, EHS systems could promote a safety culture, improve the efficiency of campus operations, and better manage risk. New technical solutions will streamline the record keeping that is the backbone of compliance, while new systems will integrate EHS data with other campus operations and management systems for real-time use and making evidence-based decisions.

Questions for institutional dialogue

- What sort of technology does your institution use in EHS systems today? Can you make the business case for investing in new EHS systems?
- How well is EHS data integrated with other campus systems? What opportunities exist to automate the data integration for improved record keeping and compliance?

Section III:
Integrating facilities management and information technology

Executing the transformation of the college or university campus will be the responsibility of the facilities professionals within higher education—and it will not be an easy task. New technology will require new skills and new approaches to day-to-day tasks. The result, however, will be a new campus for a new era, one where technology supports smart operational decisions, enhances teaching and learning, and fulfills the mission of higher education to educate responsible global citizens.

Restructuring the facilities management organization to effectively integrate new technology

Facilities management departments were not designed with technological integration in mind. **Internal reorganization** will be necessary to prioritize systems integration, automation, and business process intelligence. The changes required will depend heavily on the size and type of institution. Large research universities will likely need to expand dedicated technical groups within facilities management to address work management, hardware maintenance and renewal, software and data management, building automation, energy accounting, campus enterprise automation, materials management, SCADA (Supervisory Control and Data Acquisition), space data, GIS, and more. Smaller campuses will need to reconfigure staffing to establish a dedicated technology group to address building and business automation systems, as well as strengthen partnerships with their colleagues in IT. Facilities organizations with limited technical capabilities at the institutional level should consider partnerships across state systems or among private institutions.

Integration with Information Technology. No matter how large or small the campus, the facilities department needs to **strengthen relationships with the IT department**. Ties can be formalized with designated liaisons but should also rely on more informal personal connections across all levels. Improved relations can start with something as simple as lunch between the senior facilities officer and the CIO once a month. The important consideration is that both Facilities Management and IT recognize the mutual benefit of a better understanding of roles and common interests.

Identification of Common Tools. There are many opportunities for collaboration to build or make available common tools that can benefit both Facilities and IT, such as 1) a space database of all IT-related server rooms, data centers, and data hubs; 2) GIS mapping of IT infrastructure; 3) data center information systems; 4) GIS inventories of audiovisual equipment by classroom/lab; and 5) preventive maintenance scheduling coordination.

Coordinated Support Systems. Collaboration to coordinate services and support of classroom technology, such as a classroom hotline, after-hours service response, component renewal, parts inventories, maintenance stocks, and work management.

Crafting policies that enhance facilities/IT integration

In the long term, the **lines between IT and facilities will blur** as technology becomes tightly integrated within the fabric of the campus. If this prediction sounds outlandish, keep in mind that this year Google filed a patent for technology that turns any wall into a touchscreen. If the walls of the campus are themselves interactive technology, where does IT end and facilities begin?

As they adjust their structure and amp up their professional goals, facilities organizations also need to assess their **internal policies** to ensure that they are up to the challenges of current technology.

Security. Security is a primary concern. Powerful systems create unprecedented risks. Hacking a building automation system, for example, could wreak havoc on a campus; an inadequate password could put an entire campus at risk. Facilities organizations need to partner with IT experts to create stringent cybersecurity protocols in line with the enterprise as a whole.

Hardware and Software Procurement. Facilities organizations should also consult with IT departments to develop **policies for testing and approving new software and equipment.** New facilities systems are too complicated and mission critical for their selection to be ad hoc. A process should be put in place for assessment, selection, rollout, and support. Standards need to be set to vet new solutions, especially when the goal is to increase integration and interoperability. New systems need to be able to talk to one another; it is likely that they will rely on the same open source platform.

Creating successful facilities/IT integration

Senior facilities officers will need to consider dozens of details to harness the potential of technology, and transparency and participation are key in the decision-making process. Some critical points brought up in discussions at the Thought Leaders symposium include the following:

- Identifying synergies between Facilities and IT. Make the effort to identify mutually beneficial improvements and tools.
- Building maintenance and IT maintenance cycles should be coordinated. Communication will make maintenance easier for both organizations, especially for mission-critical data centers and communication hubs.
- Commissioning should include an IT component to ensure that the technology within new buildings, both building systems and user systems (such as audiovisual equipment in classrooms), is operating at peak capacity.
- Clear responsibility and clear line of authority need to be established for technology decision-making across the campus. All systems and software need an owner.
- While IT can support Facilities with advanced technology, Facilities can support IT with sustainability. The departments should find ways together to cut energy costs and improve the efficiency of IT operations.

Data Point:
Benchmarking to improve operations

Reliance on APPA operational guidelines to shape facilities management

"We [Philadelphia University] are small, tuition-driven, and private, with the desired ability to be nimble. We're not heavily endowed but are committed to sound financial management. It's vital to understand which standards must be reached and which are not practical. So, given our resources, it is not the University's priority to be a showplace facility, but everyone from the president on down to staff must agree on the established expectations.

"APPA's tables of standards are invaluable. They show everyone involved what the best practices and expectations should be for an institution operating at a desired level. For maintenance we commit to Level 3, managed care, and strive for Level 2, comprehensive stewardship.

"In grounds we adopted and customized the APPA tables creating a campus plan with mapped maintenance zones, detailing services, and we categorized every plant as native, invasive or non-native/non-invasive. Our costs are level, but we're getting more bang for the buck. We're practicing sustainability, keeping some spaces more meadow-like with native plants, but our greens are sharp, and our highest impact areas are showplaces."

— *Thomas Becker, associate vice president of operations at Philadelphia University, quoted in: Anita Blumenthal, "Getting Better all the Time: New Thinking & Rethinking Generate Innovative Strategies, Best Practices," APPA's* Facilities Manager *magazine, July/August 2013*

- Planning and design guidelines need to address technology. Technology requirements should be as clear and straightforward as lighting or furniture specifications.
- IT and facilities departments should establish procedures for working together that include clear assignment of roles and responsibilities and clear lines of communication.
- Master plans must be coordinated to include concepts and standards important to Facilities and to IT.
- Collaborate and reach consensus on designs for mission-critical services so that maintainability and system redundancy can be retained. Include energy efficiency goals at each step of the design.

Data Point: Facilities systems integration

Increased energy efficiency with an integrated facilities management system

The San Mateo County Community College District recently announced the implementation of a new comprehensive system to maximize energy use while integrating facilities information. The system incorporates building control, energy management, and building analytics into a single platform that allows facilities managers to visualize, analyze, and implement energy performance strategies. With real-time analysis and actionable suggestions, the system is a glimpse into the future of the integrated building systems that experts predict will soon be found on campuses across North America.

— Information from: Joshua Bolkan, "California community college district aims to improve energy efficiency with analytics," Campus Technology, *July 9, 2015*

Facilities professional of the future

Facilities experts will need to change along with their departments. The **demands on facilities professionals** have grown over the decades, but technological innovation poses unprecedented challenges. Facilities managers must learn how to function in a multidisciplinary world and communicate with a wide variety of audiences while mastering professional skills, technical innovations, and global competencies. Their time will be spent on ideas and insights rather than routine maintenance and management. A commitment to the continuous training of employees is critical.

The greatest value that facilities professionals will offer their institutions will be as **super strategists**. They will leverage the data available to the organization to spot trends and adapt proactively. Reactive maintenance — something fails, and someone goes to fix it—will be trumped by proactive, planned maintenance. Looking ahead, facilities management will become more proactive. Facilities managers will identify and implement integrated cooperative strategies.

Certainly technology will facilitate this process. The Internet of Things will create a campus buzzing with **smart equipment** that will monitor and communicate the slightest deterioration in performance. The idea of facilities without failures—no water leaks, no broken wires, no stalled elevators, no hot/cold calls—may seem far-fetched, but new technology will bend the curve toward failure rates unimaginable in previous eras.

However, technology will only achieve its full potential if it is managed by facilities professionals with an **ambitious strategic vision** of the future. The most successful leaders will be ones who use technology to resolve problems that no one ever imagined were solvable.

Imagining the IT/facilities integration of the future: where we are going

The potential of technology and facilities integration is difficult to grasp. Undoubtedly, facilities professionals of the future will invent systems impossible to predict today. However, some innovations are not only possible but probable within the next 5 years to 10 years. The technology for the solutions discussed in the rest of this section does not yet exist—but it will, and participants at the Thought Leaders symposium predict that the campus of tomorrow will see these developments soon.

Personalized learning and work spaces. Technology will recognize students, faculty members, and staff personnel the instant that they walk into a room. Buildings

Data Point:
Developing future facilities professionals

Engaging high school and college students with a global (even intergalactic) initiative

The professionals of the future are gaining insights into facilities management challenges that Earth-bound experts can hardly imagine by participating in the Mars City Facility Ops Challenge developed by the National Institute of Building Sciences, Total Learning Research Institute, NASA, and International Facility Management Association.

The program allows students to perform as facilities managers responsible for maintaining a virtual base on Mars. High school and community college students will work as teams to keep the water, energy, HVAC, and other building systems operational—on another planet.

While a simulation, the project uses an actual building information model of the Mars City facility developed by professional designers. Teams will employ professional maintenance software in scenarios developed by teams of facilities management professionals. As well as furthering science, technology, engineering, and mathematics (STEM) skills and promoting interest in facilities management careers, the Mars City project will build skills needed by 21st century facilities professionals: teamwork, communication, and a global perspective.

— Information from: National Institute of Building Sciences, "Buildings-focused STEM education program reaches important milestone," press release, July 24, 2014

will respond to users, customizing spaces to meet their needs. Responsive spaces will increase engagement with students and faculty, making even classrooms and labs adapt to users.

Powerful, real-time facilities information management systems that integrate data, increase efficiency, and improve the credibility of decision making. Powerful platforms will streamline the day-to-day activities of facilities management, from ordering parts to tracking maintenance histories and calling up building plans. The system will start at the ground level, managing the details of operations, but will extend all the way to top-level management, with tools for predictive analytics and business intelligence.

Building designs based on the use of existing spaces. In the past, the campus was the invention of administrators, donors, and architects who offered ideas about how the campus should operate. Tomorrow, buildings will be designed, in effect, by those who use them, through systems that track how students, faculty, and staff interact with their spaces.

Space management systems that track and allocate campus resources as needed. Space allocation will be examined in real time, then managed with an eye toward flexibility. Staff members who work on laptops will reserve desks when they need focused time but otherwise will share general space. Classes will rotate among rooms depending on what work they are doing that day. Space will be valued as a prized resource and will be conserved for its most productive and important purposes.

Conclusion:
Evolving facilities, evolving skill sets

This report has focused on the evolving idea of the college or university "campus" as higher education is transformed by technology. The campus of the technology age isn't your grandparents' campus. The entire framework for delivering and receiving an education is changing.

It is also clear at this point that as the campus evolves, so too must the skills of facilities professionals. This industry has already undergone a remarkable evolution, as facilities managers undertook new challenges and mastered new skills over the last 50 years. The evolution required in the next 50 years will be even greater. In the past, buildings were static things—they sat unmoving and unresponsive as events happened within them. Soon, buildings will be "alive," sensing the world through sophisticated monitoring systems, deciding for themselves what they need based on powerful algorithms, and communicating their condition 24/7. Managing an entire "zoo" of "smart" buildings, all evolving at a pace faster than any seen before, will place unprecedented demands on facilities professionals, who must become experts in the care of a new breed of campus facilities.

What will it take to successfully manage the new campus? This report introduced the idea of the facilities professional as a "super strategist"; an idea worth emphasizing. A major culture shift is required. Making the new campus a reality will require more than technology. It will require a new way of thinking, one that is fast, adaptive, insightful, and visionary.

Super strategists will keep their eye on the big picture. They'll understand the mission of their institution and harness all the resources at their disposal to reach their desired goals. They'll anticipate what's coming rather than simply reacting to events. Their skills will extend beyond disciplines and departments. They will be integrators, gathering information from multiple sources, looking at it from all angles, and discovering connections in unexpected places.

Sound like an intimidating job description? Absolutely! Super strategists won't just appear out of nowhere. The higher education facilities industry must make a deliberate and sustained effort to develop these capabilities within its ranks. As a profession, we must break down the needed competencies into manageable components and determine how to teach new skills and encourage new ideas. We must scour our ranks for promising individuals with curious minds and wide-ranging vision. We must study both the successes and failures of other industries that have undergone major transformations and adapt what works to our industry.

The stakes are high. For decades, higher education was a stable industry, but this period of disruption could shake the foundations of colleges and universities. We could see losers as well as winners. No one can make change go away by ignoring it. As much as they already have on their plates—and we know you're already confronting myriad day-to-day challenges from aging buildings to tight budgets—facilities professionals need to look to the future and understand how they as individuals can become more strategic in their thinking.

Ask yourself: What don't I know? What am I missing? What connections can I make within my institution to broaden my perspective?

Senior facilities officers should ask questions about their departments as well: Who within the ranks has a multidisciplinary, strategic way of thinking? How can we encourage that approach within the organization? What skills are missing on our team? Does our organizational structure help or hinder integration with IT? How can we position ourselves to be more proactive?

The campus is changing. The professionals responsible for the campus must change as well. Are you ready?

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