

FACILITIES manager

NOV/DEC 2013

REIMAGING THE FUTURE OF HIGHER EDUCATION

INSIDE

Empowering Teams
Through Technology

Using Control Charts to
Monitor Temperature

VFDs—Electrical Parasites?

2013 Thought Leaders
Report, Part 2

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Reimagining the Future of Higher Education—Technology is Changing the Delivery of Knowledge

By Anita Blumenthal

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By Scott Cormier

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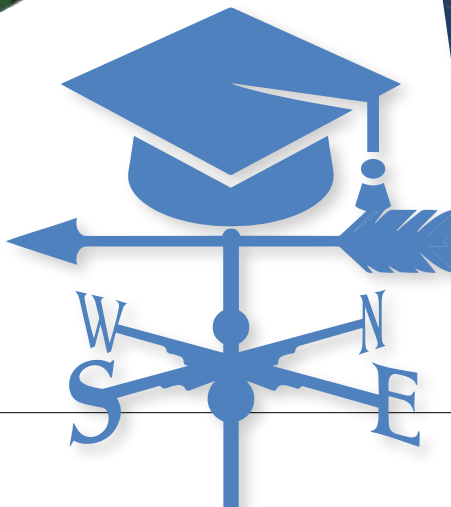
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About APPA

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 5,200 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.

A FIRST TIME FOR EVERYTHING

As APPA continues its Centennial Celebration, we thought it a good time to share a random sampling of events, people, awards, and programs that had their first showing during our 100-year history. Below are only a few of the great memories that APPA and its members have created since the association's creation in 1914, and you can see more on pages 26-27. There are many more "firsts" in APPA's history, and many more still to come.



First Facilities Management Handbook – *A Basic Manual for Physical Plant Administration*, ed. by George O. Weber, 1974. Followed by three editions of APPA's *Facilities Management* manual and leading to the current online Body of Knowledge (BOK).

First Issue of APPA Newsletter, association's first periodical - 1952

First Issue of Facilities Manager – Spring/Summer 1985



First Issue of Inside APPA e-newsletter – 2001


First APPA Website - 1995

First Completed Project for the Center for Facilities Research – Workplace Violence in Higher Education, Edward Rice, Kansas State University, 2002

First Supervisor's Toolkit Programs – Pilot sessions at Howard University, Reed College, and the University of Central Florida, 2003; first official Toolkit held in conjunction with the APPA Institute at Indian Wells, California, September 2003.



First Female Executive Vice President – Lander Medlin, 1996-present

First Facilities Management Evaluation Program – University of Arizona, 1989 (beta); Medical University of South Carolina, 1989 (official first). 

Coming in Jan/Feb 2014

- Interview with Futurist Richard Katz
- Reports from 2013 Regional Conferences
- Focus on Emerging Professionals

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facilities digest

By Anita Dosik

APPA 2014 AWARDS NOMINATIONS NOW OPEN

Deadline for Applications is January 31, 2014

Nominations are now being accepted for the following APPA 2014 institutional and individual awards:

- Award for Excellence
- Sustainability Award
- Effective and Innovative Practices Award

(For questions contact your regional representative for Professional Affairs at www.appa.org/committees/professionalaaffairs.cfm.)

- Meritorious Service Award
- Pacesetter Award
- APPA Fellow

(For questions contact your regional representative for Awards and Recognition at www.appa.org/committees/awardsRecognition.cfm.)

The deadline for consideration for the 2014 awards is

January 31, 2014. Visit www.appa.org/recognition/ for award details and online application forms. If you have questions about the award process, contact Christina Hills at christina@appa.org.

SEE YOU IN SAN DIEGO IN 2014!

It isn't too early to start planning to attend next year's APPA Conference & Exposition! **APPA 2014** will be held **July 21-23, in San Diego, California.** You won't want to miss this exciting celebration for the association's 100 years of service to the profession of educational facilities management.

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July 21-23 2014

BECOME AN APPA OFFICER: NOMINATIONS FOR 2014 NOW OPEN

APPA's strong and steady volunteer leadership is one of the core forces making it the "association of choice" for educational facilities professionals. Consider becoming a candidate for an elected APPA officer.

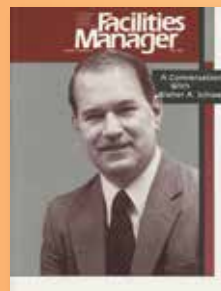
Elected officers gain enormous leadership skills and a chance to develop professionally in many meaningful ways, as it provides a major opportunity to give back to the entire profession. Being an APPA elected official does require a personal commitment of time and energy. However, past elected officers will tell you the personal rewards and professional benefits outweigh the costs of engagement and time commitments. There are five elected officer leadership positions, three of which will be on the 2014 ballot: President-Elect, Secretary-Treasurer, and Vice President for Professional Affairs.

Consider nominating yourself—or others—for the one that best matches your passion and areas of expertise. Learn more at www.appa.org/board/electedofficers.cfm.

**All applications and nominations for APPA office are due no later than
December 16, 2013.**

FACILITIES manager

Through the years...





THE RISING COST OF HIGHER EDUCATION: THE THEME FOR THE NEWLY RELEASED 2013 APFA THOUGHT LEADERS REPORT

The 2013 Thought Leaders report, *The Rising Cost of Higher Education*, has now been published and posted to the APFA bookstore. You will find a full description of this product as well as ordering information at https://www.apfa.org/bookstore/product_browse.cfm?itemnumber=761. Be sure to share this with your committees, regions, and other interested parties. There is no charge for the report, and it is available as a PDF download. APFA 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.

TAKE PART IN THE ANNUAL FACILITIES PERFORMANCE INDICATORS SURVEY—DEADLINE: DEC 16!

- Make the Business Case for Your Facilities Needs
- Successfully Address Capital Asset Realities
- Create a Balanced Performance Score Card Based on Critical Data Findings
- Compare and Contrast Your Facilities Operations with Other Institutions
- Align Facilities Planning with Your Institution's Mission and Vision



It is time for you to pull together your data and complete the 2012-13 FPI survey. The firm deadline for completion is 6:00 p.m. Eastern, December 16, 2013, so the time is now to collect your data and complete the survey. For more information and to register for the survey, go to <http://www.apfa.org/research/FPI/index.cfm>. For assistance, contact Christina Hills at christina@apfa.org.

EVENTS

APFA EVENTS

Dec. 3-6, 2013 Women's Leadership Institute (co-produced by APFA & CHEMA associations), Amelia Island, FL

Feb 2-6, 2014 APFA U: Institute for Facilities Management, Dallas, TX

Feb 2-6, 2014 APFA U: Leadership Academy, Dallas, TX

Mar 3-4, 2014 9th Annual Smart & Sustainable Campuses Conference, Baltimore, MD

Apr 12, 2014 Credentialing Prep Course & Exam (CEFP & EFP), El Paso, TX

Jul 21-23, 2014 APFA 2014: Centennial Celebration & Annual Conference, San Diego, CA

REGIONAL EVENTS

Feb 25 – Mar 1, 2014 CAPPA 2014 Technology & Leadership Conference, San Antonio, TX

Mar 6-7, 2014 NCAPPA Chapter Conference, Buies Creek, NC (Campbell University)

Mar 12, 2014 VAPPA Chapter Conference, Charlottesville, VA (University of Virginia)

Mar 17-21, 2014 APFA's Supervisor's Toolkit (spons. By SRAPPA), Charlotte, NC (UNC Charlotte)

Sep 16-20, 2014 MAPPA 2014 Conference, West Lafayette, IN

Sep 21-24, 2014 ERAPPA 2014 Conference, Atlantic City, NJ

Sep 21-24, 2014 CAPPA 2014 Conference, El Paso, TX

Sep 22-24, 2014 RMA 2014 Conference, Santa Fe, NM

Oct 4-7, 2014 SRAPPA 2014 Conference, Huntington, WV

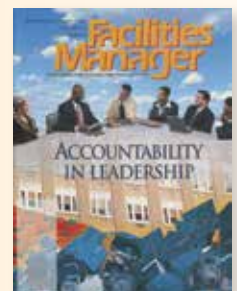
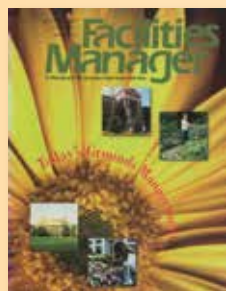
For more information or to submit your organization's event, visit www.apfa.org/calendar.

The Telly Awards



"APFA TRANSFORMATION" VIDEO EARNS APFA A TELLY AWARD

APFA is proud to announce that its membership promotional video, entitled "APFA Transformation," was recently selected as a winner of the 34th Annual Telly Award. The Telly Award is recognized within the visual arts community as a prestigious honor, bestowed to the finest film and video productions, groundbreaking Web commercials, videos, and films, and outstanding local, regional, and cable TV commercials and programs. This most recent Telly Award program received over 12,000 entries from all 50 states and 5 continents. The award-winning "APFA Transformation" video is available for viewing, on the APFA YouTube Channel.





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 CEFP or EFP 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>.

GET YOUR CAREER ON TRACK FOR SUCCESS—BECOME APPA CERTIFIED! REGISTER AND RECEIVE A DISCOUNT OF \$200 OFF YOUR EXAM FEE

Managing a campus is like managing a small city. It requires vision and comprehensive understanding of structures and their environments. Gaining an APPA certificate shows that you get it: you are familiar with standards and best practices, have the ability to perform research-backed stewardship, and know the facts and principles that contribute to creative and sound decision making.

Learn more about what APPA's Educational Facilities Professional (EFP) credential and the Certified Educational Facilities Professional (CEFP) designation can do for your career at <http://credentialing.appa.org/>.

Register for the next course and exam today!

Friday & Saturday, February 7-8, 2014 – Dallas, TX

Saturday, April 12, 2014 – El Paso, TX

APPA CONGRATULATES EFP & CEFP RECIPIENTS

The following professionals have successfully completed the requirements for APPA's CEFP and EFP credentials, from July 2013 to the present. Congratulations on their personal accomplishments.



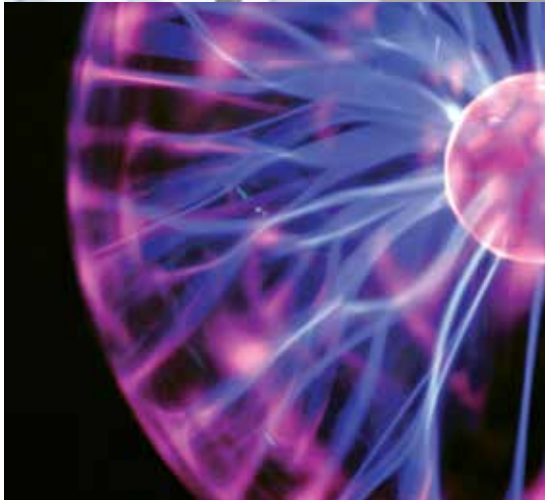
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Brenda Bullard, *Texas Tech University*
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Colleges in Crisis

By E. Lander Medlin

Economics . . . there's a reason it's called the dismal science . . . all doom and gloom! There's a lot of that today given the reports and statistics. Just take Moody's report, which downgraded higher education and identified "muted" revenue growth as the major factor. Their focus was in such areas as:

- Price sensitivity
- Decline in state appropriations
- Reduced federal support for research
- Waning public perception over cost, and
- Unsteady or low endowment returns.

IRON TRIANGLE

So no surprise that there is a stated two-fold need: garner alternative revenue sources, and change the business model. A tough pill to swallow for any industry especially given the historic and unprecedented rate and pace of change occurring in today's world. Certainly, this will be no simple task. Let's consider the problem from the vantage point of the "Iron Triangle" of affordability, accessibility, and accountability:

- **Affordability** meaning a student's ability and willingness to pay. In a 25-year study: a) net appropriations per student dropped from \$8,500 to \$5,900; b) net tuition per student increased dramatically from \$2,600 to \$5,200; and, c) the percentage of total education revenue from tuition jumped from 23 percent to 47.6 percent. And, in the past two decades, on average, tuition jumped 24 percent with the percentage of Household income having risen from

23 percent to 38 percent.

- **Accessibility** is dramatically affected by increases in tuition...need I say more given the above statistics? Plus, the ease of transferring credit hours from institution to institution has become an increasingly critical factor in lengthening student's time-to-graduation.
- **Accountability**, where public opinion of higher education (as well as of federal and state legislators) is waning. All are pushing increased performance measures and outcomes.
- Then add the "**Arms Race**," driving all kinds of costs (faculty, program proliferation, student amenities, buildings/facilities, etc.) even though in some cases these are necessary expenditures in the competition for students and faculty. A real conundrum!



THE CERTAINTIES OF THE PAST ARE NO LONGER CERTAINTIES.
WE MUST PONDER ANEW.

OUR BUSINESS

All this leads to the daunting question: "is college worth it?" Measured in employability and salaries, we're not faring much better since employment for degreed graduates is down and student debt has surpassed a trillion dollars. The ultimate question is how we as an academy can really help our students be successful.

Consider higher education like the railroad industry in the 1940s and '50s when those who failed viewed themselves as being in the "railroad" business versus those who succeeded viewed themselves in the "Transportation" business. We need to be in the "Student Success" business and, therefore, abandon the old rails of traditional instruction and delivery, in whatever form.

So when it comes to the economic "recovery," we should not expect the

pendulum to swing back to the good times of adequate state funding nor continue to consider tuition as a major source of new revenue. Those days are gone. The business cycle just can't produce that expected traditional yield any longer. This would explain Moody's reporting of a "failed business model" if we stay on this same path.

Other factors have thrown colleges into crisis as we look toward a prognosis for 2020.

- Student Demographics – centered on price, population (e.g., high school graduates in decline in most geographic areas of the U.S.), and preferences are like shifting sand as the student makeup or mix will be quite different quite soon, and expectations change.
- Competition – not only with providers internally/nationally in the existing academic community, but internationally given globalization of the marketplace.
- Regulation, Compliance, and Sustainability – in a world of increasing unfunded mandates and the need, the imperative, to sustain the environment we all live and work. And then there's . . .
- Technology – challenging traditional delivery systems such as MOOCs (massive open online courses), pedagogical shifts, student demands and expectations, access, structure and cost, where content is ubiquitous. We are living in exponential times but continuing to deliver in linear, albeit incremental, steps.

In an essay, "An Avalanche is Coming: Higher Education and the Revolution Ahead" written for the Institute for Public Policy Research in March 2013, the authors posit whether a university education will continue to be seen as good value. This was further elucidated by David Puttnam in a speech at MIT, June 2012, stating, "It's tragic because, by my reading, should we fail to radically change our approach to education, the same cohort we're attempting to "protect" could find that their entire future is scuttled by our timidity."

TRANSFORMATION

Clearly the forces of technology and globalization are transforming our industry sector. We are seeing the unbundling of various functions previously served by the traditional university being increasingly supplied by other providers (MOOCs, EORs, for-profit institutions, think tanks, etc.). We must calculate the risks of doing nothing versus just the risks of action.

The certainties of the past are no longer certainties. We must ponder anew. And, if one considers the analogy of an avalanche coming? Standing still is not an option!

Don't just hope it will get better or deny your role in helping to solve these problems. Hope is not a strategy and denial is not a plan. APPA can help. In the latest 2013 Thought Leaders Symposium monograph, *The Rising Cost of Higher Education*, the challenges leading to/driving increased costs were discussed in detail. Briefly, they are:

- Academic productivity – workload, credit hours, time-to-degree;
- Unexamined assumptions and decision-making process – traditional budgeting, quality, spending competition, etc.;
- Financial model – looking more and more like it's broken;
- Pedagogical changes – rapid in nature and requiring a blended technological/physical space approach;
- Space management – inventory, utilization (occupied/utilized rates), considered "free" yet expensive, poor functionality and design;
- Labor costs – aging workforce, increasing retirements, human resource policies and practices, skill levels for advanced building systems;
- Regulatory requirements and compliance – increased regulatory environment and unfunded mandates driving up costs.

Some strategies identified by the TLS participants for addressing these challenges were:

- Focus – priorities and program alignment with the institution's vision and mission (avoiding mission creep)

- Collaboration – across, between institutions, and the private sector
- Technology – to further increase quality, improve delivery, and contain costs
- Space Management – effective and efficient utilization
- Revenue Enhancements – to reach new markets (a mix of student demographic targets, focus on institutional brand and niche, etc.)

PROMOTING DIALOG

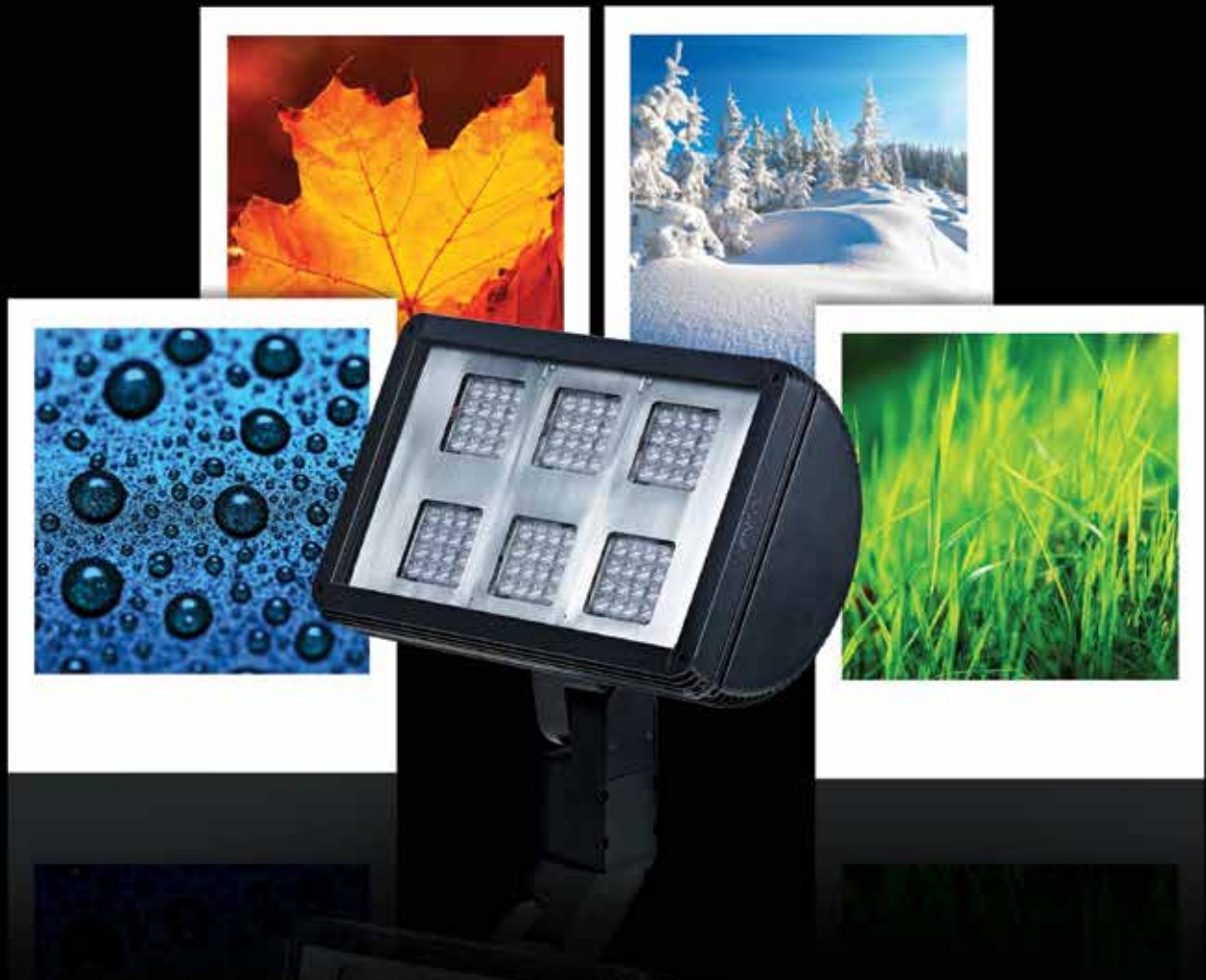
Not only were these challenges and strategies distilled in the most recent Thought Leaders monograph, the critical facilities issues were identified with key questions to promote dialogue at your institution. Again, all of these points and more are discussed in much greater detail in this year's issue of the Thought Leaders report. Of course, Part 2 highlighting the top facilities issues is printed in this issue of the magazine, with Part 1 previously published in the September/October issue. As always, the entire monograph, along with all prior monographs published since 2006, are available as free PDF downloadable files via the new APPA website to help you focus on these important issues.

Ultimately, goring such "sacred cows" as capacity utilization (faculty and facilities); one-time donor money for new building construction only, "arms" race spending; and the financial and political costs of attrition, will be critical if we are to tackle today's dilemmas and ensure tomorrow's future.

Yogi Berra was right, "The future ain't what it used to be!" Yet these challenges can be transformed into opportunities to reinvent and rebundle our industry. Will we collaborate with our institutional colleagues and counterparts to tackle these critical issues? Will we ensure focus is on student success? Otherwise, what world are we preparing students for? ... Their future or our past? §

Lander Medlin is APPA's executive vice president; she can be reached at lander@appa.org.

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APPA: The Gathering Place

By Leon J. Bivens Sr., EFP

The field of facilities management is emerging, and offers many dynamic career growth opportunities, especially in the education sector. With the responsibility of providing service to diverse populations of students, faculty, and staff members, along with maintaining affirmative connections to local communities, our challenges include finding acceptable resources for continued career growth.

With more than 5,200 educational facilities management professionals, and 1,500 member universities, colleges, private and public K-12 schools, museums, libraries, and other organizations dedicated to learning throughout the United States and abroad, APPA is a partner organization that provides a broad range of services to professionals who are engaged in the field of educational facilities management. Members comprise—but are not limited to—technicians, supervisors, managers, directors, vice presidents, and business partners. Whether you're new to the field of educational facilities management or a seasoned specialist, APPA's resources offer a spectacular opportunity to develop and expand your skills, connect with its ever-growing network of facilities professionals, or utilize its vast bank of knowledge-based research, best practices, industry guidelines, and focused publications, to find creative solutions to impending issues.

MANY FORUMS IN MANY PLACES

Throughout its rich 99-year history, APPA has long been considered “the

gathering place for those of us engaged in the field of educational facilities management.” It offers innovative, cutting-edge professional development, education/training programs, and credentialing throughout its U.S. and Canadian regions. In an effort to expand its presence, APPA has expanded to other countries throughout the world, to include Mexico, Egypt, Israel, Saudi Arabia, Thailand, Finland, France, Ecuador, Republic of China, South Africa, England, Fiji, Papua New Guinea, Cyprus, the British Virgin Islands, the West Indies, Australia, Hong Kong, Indonesia, Kampuchea, Laos, Malaysia, New Zealand, Philippines, Singapore, Taiwan, and Vietnam.

APPA promotes leadership in educational facilities through a variety of forums that address trends, issues, and best practices in educational facilities

management. Some of the expansive and ever-evolving venues for career growth and expansion include professional development, education/training, and credentialing. APPA also offers a knowledge bank of research, best practices, creative solutions, industry guidelines and focused publications; an international network of professionals and colleagues including regional, state, and local chapters; career assistance through its Job Express and Resume Bank; and finally, international awards and recognition programs specifically for educational facilities.

One of APPA's core goals is to elevate facilities professionals into influential leaders in education by transforming individual facilities professionals into higher performing leaders—it achieves this through APPA U, which provides professional develop-



APPA U

EACH APPA CREDENTIAL, OR CERTIFICATION, ALLOWS EDUCATIONAL FACILITIES PROFESSIONALS TO DEMONSTRATE A CAREER COMMITMENT TO ONGOING PROFESSIONAL DEVELOPMENT AND CONTINUOUS IMPROVEMENT.

ment opportunities through its many venues and are considered the industry standard for educational facilities professionals.

The foundational **Institute for Facilities Management**, which is offered twice per year (January & September), affords facilities

professionals the opportunity to receive additional training in four career-enhancing core areas: energy and utilities; planning, design, and construction; general administration and management; and maintenance and operations.

APPA's **Leadership Academy** "enhances and further develops leadership throughout the educational industry. The Leadership Academy provides opportunities for professionals to increase their awareness of industry issues, to learn the skills necessary to handle today's changes, and to discover the leadership potential within each of us." The program is designed with four tracks, and each one emphasizes a different perspective and type of leadership skill. The four tracks of the Leadership Academy consist of: 1) Individual Effectiveness Skills; 2) Interpersonal Effectiveness Skills; 3) Managerial Effectiveness Skills; and 4) Organizational Effectiveness Skills.

The **Supervisor's Toolkit** provides exceptional learning opportunities in the "nuts and bolts of facilities supervision." This program delivers a diverse range of modules that train facilities supervisors in areas that are not only



critical to their respective departments, but ultimately have an impact on student recruitment and retention, faculty and staff productivity, and the overall institutions for which they work. Credentialing programs, as provided by APPA, may be considered the gold standard for educational facilities professionals and are available in a variety of areas, or certification levels.

Members of APPA may seek qualification as an **Educational Facilities Professional (EFP)**, or **Certified Educational Facilities Professional (CEFP)**.

The EFP certification is designed for individuals who may be considered emerging facilities professionals. Conversely, the CEFP is intended to provide further credentialing for qualified individuals who have achieved a minimum of five years in educational or non-educational facilities related work. Each APPA credential, or certification, allows educational facilities professionals to demonstrate a career commitment to ongoing professional development and continuous improvement. It expands professional knowledge and industry understanding among educational facilities professionals, and provides the ancillary benefit of demonstrating that the campus facilities organization is comprised of qualified, competent, and learned professionals. This con-

tributes to the sustainability of campus operations, and provides an incentive for

employee recruitment and retention by characterizing the organizations' interest in developing its most valued asset—its staff members.

PERSONAL JOURNEYS

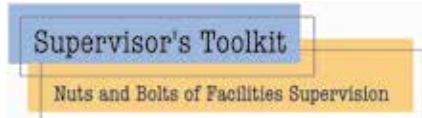
On a personal note APPA, ERAPPA (Eastern Region), and MD/DCAPPA (our local chapter) have been good for our institution, the University of Maryland Eastern Shore. We have utilized many of the training programs with great results. One of our members has attained EFP recognition, which adds credibility to the physical plant. Our management team has become more effective in supervising staff by including them as team members. This has

been a great morale booster. Although we have limited resources we continue to lower our carbon footprint as well as our energy use by following APPA's best practices.

There is only one thing left to say...Become a member of APPA today and begin a relationship with

a great network of peers who care and who are willing to share their successes to help your organization to grow and their failures so you will make fewer mistakes. I hope you are as excited about APPA as I am. If you know someone who could benefit from a membership with APPA, give them a call or send them an e-mail inviting them to join you as a member. ☺

Leon Bivens is director of physical plant at the University of Maryland Eastern Shore, Princess Anne, MD. He can be reached at ljbivens@umes.edu. This is his first article for *Facilities Manager*.





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The Winds are Blowing Down the Door

Preparing for Dramatic Changes

By Joe Whitefield

[Ed. Note: In the spirit of change discussed here, the COIN Toss column has been renamed Enabling Leadership, to more accurately describe the important leadership issues presented by author Joe Whitefield.]

Last summer, while participating in both the APPA 2013 conference and the Senior Facilities Officer Summit in Minneapolis, Minnesota, I was somewhat taken aback by the several presentations speaking to the current and impending changing environment of higher education. I understood there are many forces of change at the door of higher education, but I have been underestimating the magnitude of the forces and the potential impacts of the changes.

THE NATURE OF CHANGE

What changes you ask? For starters, how about dramatic shifts in:

- the demographics of students and workforce—the millennials are here
- enrollment trends (from increasing to decreasing) for many institutions
- technologies that slay the traditional classroom lecture format on campus
- technologies that undercut the very need for facilities that support traditional classroom formats
- the expectations of students regarding the employment prospects of their education
- the expectations of employers regarding the skills of graduating students
- increased requirements relating to student retention and graduation rates
- financial models and numerous revenue source issues

In short, everything appears to be on the table. Long-held beliefs concerning the need for a college degree and the costs and benefits thereof are being re-thought and challenged by all. Growing student enrollments are no longer considered a sure thing for many institutions. And, of course, all of this impacts the demand for and expectations of the facilities and the facilities management organization.

EMERGE STRONG

Every institution is now grappling with these new emerging paradigms. Undoubtedly, some will be progressive and responsive, emerging stronger in this environment. Others will be more reactionary, suffer from poor timing, and

have a mighty struggle on their hands. Regardless of where your institution is as a whole, it is time for strong facilities managers to rethink the immediate future of the facilities and the organizations they manage during these times of change.

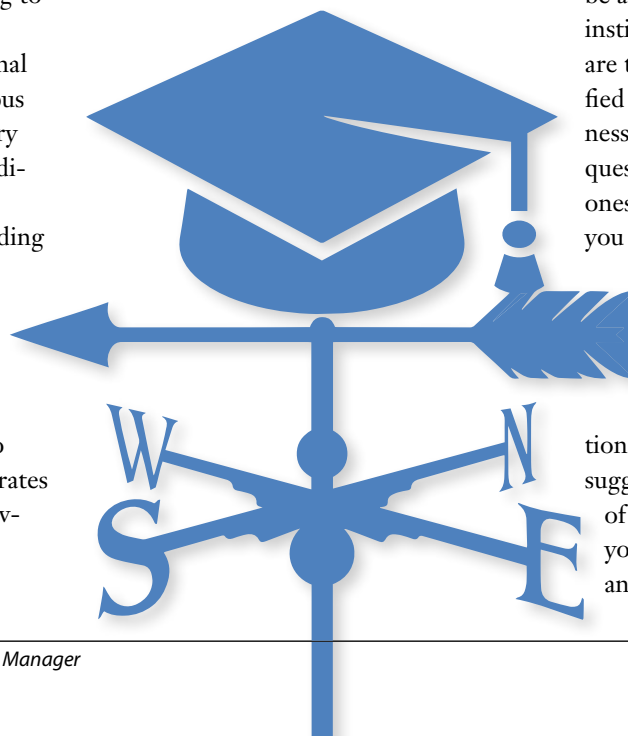
In addressing the overall topic of the changing environment in higher education stemming from disruptive innovation at the APPA conference, speaker Ian Jukes displayed the following quote from Jack Welch:

When the rate of change outside an organization is greater than the rate of change inside an organization, the end is in sight.

Based on the emerging trends, the predicted outcome of this quote may not be an exaggeration for many educational institutions. Given that, how effectively are the elements of change being identified and how effective is the responsiveness of your organization? Difficult questions, I know, but very important ones nonetheless. If you haven't already, you should initiate some type of exercise at your institution to begin exploring these issues.

TRADITION...

In order to add a sense of direction for any exercise of this type, I would suggest you begin with two major areas of focus for both your institution and your facilities organization—**tradition** and **value**. It begins with lead-off ques-



tion: does your institution have enough tradition to support itself through the changing environment? Traditions are powerful foundations for many institutions. They can provide the structural mass on which so much institutional success is built.

Perhaps your institution has enough of the right type of tradition to buttress it from the impacts of oncoming change—perhaps not. If not, the second question becomes even more important: does your institution or organization provide enough value to support itself through the changing environment? The value questions are being asked of every institution and every department therein. At a time when rising costs of education are evident, the benefits are no longer simply assumed. To be valuable, the benefits must be real, recognizable, quantifiable, and worth the costs. This applies to the institution as a whole and to the facilities

department in particular. Even if tradition is an insulator for you, it should not be a reason to forgo the value portions of any self assessment.

Interestingly, these questions were posed by Duane Hickling to a group of senior facilities officers at the SFO Summit. Their challenge was to consider a list of potential metrics that institutions should be monitoring in these areas. I recommend this useful exercise for all facilities managers at their current institution. These metrics should be useful in quantifying the forces of change and provide guidance on responsive measures of the institution. Consider the functionality, efficiency, condition, and costs associated with your facilities and space management programs.

Proper metrics should help determine which areas of the organization are currently contributing to the success of the institution and which ones are not.

And which areas of the organization can stand up to the impending impacts of the forces of change that are at the door. Make it relevant. Ian Jukes puts it this way: “The continued existence of the current system is not assured.” Don’t get in a position of simply doing the wrong thing well, because “there is little interest or market for obsolete excellence.”

One final thought on the need to understand the changing paradigms and prepare for their impacts. It will not be business as usual. The consequences for many will be more severe and even detrimental. So, read more, network and collaborate more, think harder, and stay with it. That is the nature of change; once you have figured it out, it changes. ☎

Joe Whitefield is executive director of facilities services at Middle Tennessee University, Murfreesboro, TN. He can be reached at joe.whitefield@mtsu.edu.



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Kelly Baxley, account executive, Siemens Building
Technologies

SPEAKERS

Dr. Jacques du Plessis, interim associate vice chancellor
for information technology, University of Wisconsin
Milwaukee

Dr. Linda Hanson, president, Hamline University

Dr. Ellen Junn, provost and vice president for academic
affairs, San José State University



“Higher education is at a crossroads,” Kelly Baxley declared as he introduced the plenary session at the APPA 2013 conference in Minneapolis last August. “The sector urgently needs to innovate because becoming a savvy user of technology is now a requirement, regardless of industry or career path. The vast proliferation of mobile devices demands that education become green, global, and mobile,” he said. “Emerging areas such as cybersecurity, big data, predictive analytics, and the Internet of everything are generating new challenges and opportunities for many industries, including higher education.” Further, he noted that the advent of massive open online courses (MOOCs) has introduced new dimensions to discussions about online and physical campus experience.

In their presentations and their responses during the Q&A session that followed, the speakers discussed the impact of these technologies on higher education, including their own institutions’ challenges and responses. Repeatedly, they stressed the need for an integrated approach, from the ground up, with academic, technology, and facilities sides of the house collaborating to achieve sustainable institutions and thriving communities of student-centered learning.

CONTINUOUS TECH INNOVATIONS

The Internet and constant advances in technology have radically changed higher education delivery. These advances are moving the industry to evaluate not only what new facilities are needed and how to equip them, but also what facilities are less in demand and how to repurpose them.

Tech upgrades are ubiquitous. For example, Provost Ellen Junn reported that San Jose State University (SJSU) has tripled Wifi access and has plans for 51 classrooms equipped for interactive HD remote instructors and guest lecturers, lecture capture, and other features. All classrooms, conference rooms, and offices can use WebEx teleconferencing, and there is also a VOIP (voice over Internet protocol) phone system. In April 2013, the *Chronicle of Higher Education* named SJSU President Mo Qayoumi (an APPA Fellow) among the top ten technology innovators in the United States.

However, President Linda Hanson of Hamline University pointed out that, even as they upgrade, many institutions find that they no longer need to supply a variety of equipment they had previously provided, such as desktop and laptop computers, video production studios, etc. Both SJSU and Hamline stress a new practice for students: BYOD—bring your own device. In fact, Hanson noted that the variety of cutting-edge devices that students bring to campus is driving change. “This is a change that all institutions of all sizes, staff sizes, and budgets have to deal with,” she said. “Students expect the colleges to have the resources to support the devices they bring—and to support their learning outcomes 24/7/365.”

Hanson explained that Hamline’s response is to pursue an integrated model, with facilities and tech departments creating what is needed for the student learning outcomes they want. This includes providing mobility (students can be anywhere, learning on any device), flexibility (students can access course materials, group work, etc.), sufficient capacity, and virtual and physical support.

In addition, Hanson said, the university is expected to help faculty support these devices. But she admitted that there were a number of older faculty members who believe their job is to know their discipline and interact personally with students, and *not* to have to learn new technology, a task for which they have no time and are not paid.

By Anita Blumenthal



BYOD also directly affects the university's built environment. For example, Junn notes that these days, every college no longer needs to have its own physical computer lab. Further, Hanson says that Hamline's law library comprises many shelves of volumes that are little used because students use online databases. "So what should the physical library look like in the future?" she asked. Whatever the eventual answer, Hanson said that facilities need to "demonstrate a commitment to sustainable learning and living environments." Whether new or renovated, they "cannot be imagined without planned integration and adequate investment to sustain the rapid pace of changes in technology."

New digital technology can also offer new communications models that can transform the functioning of the entire campus, according to Jacques du Plessis of the University of Wisconsin

Milwaukee. He calls the field "intellification of information," which uses an "expanding array of sensors...that can measure and be aware of so much. All this information is digital, so it comes in and is stored.... This information is understood, and [therefore] when something happens, it can trigger something else" (such as turn off an automated sprinkler system when sensors send the message that it is raining).

BUILDING TOMORROW'S LEARNING SPACES

The accelerating use of technology raises major issues regarding physical plant: How do you construct a building for a school of science, for example, when the institution does not know what size or configuration it will need in just a few years?

We need "faculty-designed and discipline-specific, technologically enabled classrooms that maximize usage efficiency," Hanson said. To achieve this, she said, there must be a close connection between the faculty, who know how they want to deliver their courses, and the sides of the house that can help us design it.

Many changes have already occurred. Hanson pointed out that computers and technology-enabled modeling have replaced tasks that used to be done in labs and classrooms. "More and more professors do not want theater-style lecture halls," Junn said, "but rather want



Dr. Ellen Junn, provost and vice president for academic affairs, San José State University

furniture that can roll, allowing small group work, and they want tech-enabled classrooms.”

“Flexible facilities enable high-impact student learning,” Hanson said. “We know that; we can quantify that.”

Junn suggested that facilities managers learn about such impressive examples of this new approach as SCALE-UP (Student-Centered Active Learning Environments with Upside-down Pedagogy; see <http://scaleup.ncsu.edu/>), aimed at large introductory science courses that had previously been considered places to weed out students who wouldn’t succeed as majors in the subject, rather than serious learning opportunities for non-majors.

HYBRID COURSES—PART ONLINE, PART CLASS/LAB

Although MOOCs are much in the news, the panel also discussed other options along the continuum, including hybrids and limited-availability online for-credit offerings.

Junn described two programs, both in their initial stages. First, in collaboration with MIT, San Jose State is testing a hybrid version of one of original courses designed by edX (the Harvard/MIT MOOC). The course is the same SJSU’s Electrical Engineering 98, Circuits and Electronics course, an upper division class required for all engineering majors. The SJSU format has online components (short videos, quizzes, virtual lab, textbook) and in-class small group work, individual/group quizzes, and mini-lectures. Junn reported that the traditional classroom format averaged a 59 percent pass rate. In fall 2013, the first time the hybrid Edx version was taught, the pass rate was 91 percent. The spring 2013 pass rate was also over 90 percent.

Junn noted that the University of Florida has experimented for years with different formats, and studies have found that students prefer the hybrid model. “They are still interested in the face-to-face aspect of the university experience,” she said.

ONLINE COURSES

In its second pilot, San Jose State is collaborating with another MOOC provider, Udacity, to offer completely online courses (with support from the Gates Foundation and the National Science Foundation to study the data). The spring 2013 offerings had more than 200 students, with a focus on disadvantaged students and included remedial math and introductory courses in algebra and in statistics. The summer 2013 offerings expanded the limited enrollment to 2,000 students from the United States and abroad and offered remedial math and introductions to algebra, statistics, psychology, and computer programming. SJSU is analyzing the results and will recommence courses in spring 2014.

The summer courses were offered in the extension section of the university. Unlike MOOCs, they were not open to all, they carried university credit, and they cost \$150. Junn suggested that this approach, given the possible volume of students who might want to take credit-carrying courses online could raise significant revenue and help students take courses toward graduation that they could not otherwise fit in.

However, Junn warned that the transition to online coursework is not seamless. “Just because [students] know how to interact with some kinds of media does not mean they are digitally literate,” she said, “nor do students understand what it is like to learn in a completely different modality. Learning in an online course is radically different from taking a



Dr. Jacques du Plessis, interim
associate vice chancellor for
information technology, University of
Wisconsin Milwaukee

face-to-face class. So we have found we also have to educate even our digitally native students about how to approach and change behavior on an online course in order to succeed.”

Du Plessis of UW Milwaukee discussed the importance of completely online education for remote regions, as well as for people who can learn without classrooms. He said that the University of South Africa, with 350,000-plus distance-learning students, is working on a new model of education, which would require only a tablet—on which all textbooks would be loaded—a cell phone, and a solar panel to charge the devices. He also noted the strong trend toward competency-based education and testing. The idea that people can learn without classrooms is “a very inconvenient truth,” he said, but it is important to work out a way to be “receptive to people who can learn on their own and provide them with a way in which they can verify their skills.”

PLANNING—MORE DIFFICULT THAN EVER

Planning has always been important in facilities management, but with the radical changes taking place—and undoubtedly with many more to come—what happens to the idea of master planning? Hanson listed numerous challenges, including how to design spaces for future technology and determine the balance between physical and virtual learning spaces, as well as amounts to spend on them.

Master planning tries to predict the future, but perhaps it's rather a matter of predicting direction. For example, Junn said that today, SJSU is responding to the new fields that did not exist 10 or 20 years ago (e.g., cybersecurity, big data, learning analytics). She is responding by hiring faculty across different colleges. Also the university plans to expand the number of grad students in the STEM subjects (science, technology, engineering, math), "so we can expect to expand faculty, labs, equipment, and office space," she said. However, she admitted, "We know there will be new fields of study that do not exist today that will exist 10 or 20 years from now. How do we plan for them?"

Besides, Hamline's Hanson noted some pitfalls of the formal, long-term planning process, which can take 18 months and end by losing sight of the initial vision. Further, the plans can be derailed by unforeseen events. "We've started to think of it as a rolling plan," she said. "It must always be flexible, constantly factoring in impediments."



Du Plessis suggested that an important step to anchor any planning process is to ask, "What is the 'form factor' of the institution? How does the form limit or support you in serving your clientele? Define your clientele (rich/poor, particular discipline, ethnic groups, gender, etc.) and define your big purpose. If you focus on the form factor you have," he said, "you can understand strategically who you are and where to direct your future. "Do not try to emulate an institution that does not share your form factor," because that could result in unwise spending, among other things.

Also, du Plessis said it was important to pick up trends and directions early. "Be where you know you need to be—not what you do well," he said. "Listen to Darwin. Who survives? Whoever adapts best."

No speaker could avoid the problem of current and future funding, especially now, as Junn pointed out, with 46 states

decreasing their appropriations for public higher education, moving toward zero. However, du Plessis warned, "It is not sustainable to put the burden of financing on students," whose numbers, in any case, are dwindling in the United States. He noted more creative approaches such as compacts to share resources with other campuses and partnerships with private institutions that would, for example, contribute to building a laboratory and then use the facility as well.

EVERYONE AT THE TABLE

The changes and challenges multiply: tech-enabled classrooms; ever-smarter devices; continuous support requirements; ever-increasing capacity, flexibility, and access. "Not changing is not an option," Hanson said. "We cannot sit on our laurels, even of what we did 18 months ago." Further, she said that everyone, from governing bodies to faculty, funders, students, and alumni, must understand that "we are in and of that very porous inside-of-academia/outside-of-academia world."

The speakers agreed that the way to respond lies in an integrated model: Everyone from all sides of the house—academic, tech, and facilities—should have a place at the table and should have knowledge of needs and resources. In one example of closer coordination, Junn noted that many schools now have a separate academic technology component, concerned specifically with using technology in academics, in addition to the institution's in-

formation technology services center, often under the chief financial officer.

Du Plessis advised the tech and facilities departments to educate

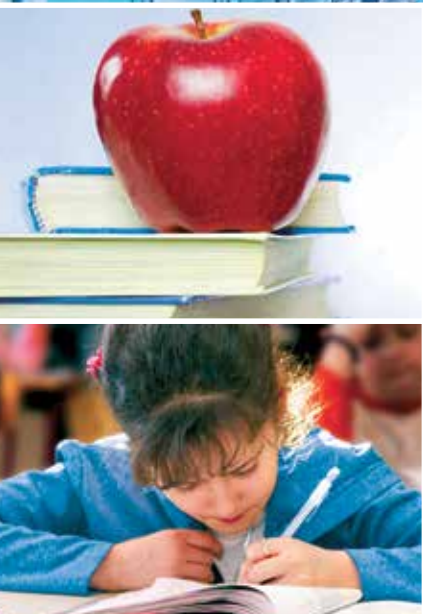
themselves about how their contributions could improve student learning. "Don't just sit back and say [to the education leadership], 'Tell me what you want and I'll do it.' That is abdicating a very important part of your responsibility," he said. Facilities managers must be able to debrief the education leaders about all the possibilities. "Show them your expertise in knowing what's out there," he said. "You've got to deliver some pieces [to which they can respond], 'Ah, that gives me an idea.' And then, the conversation starts." ☎

Anita Blumenthal is a freelance writer based in Potomac, MD. She can be reached at anitablu@earthlink.net.

Dr. Linda Hanson, president,
Hamline University

A video of this plenary session is available at
www.youtube.com/watch?v=yTe7al_e0Ko

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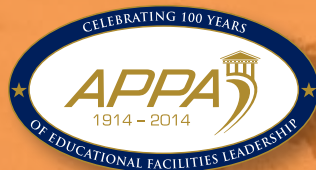
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First Organization Name

Association of Superintendents of Buildings and Grounds of the Central Western Colleges & Universities

First K-12 to Attend an APPA Meeting

Indianapolis (IN) Public Schools, 1916



1

First APPA President – James H. Marks, University of Michigan, 1915

First APPA President to Serve Two

Separate Terms – Albert W. McConnell, University of Wisconsin, 1916 & 1918

First (Interim) Association Executive

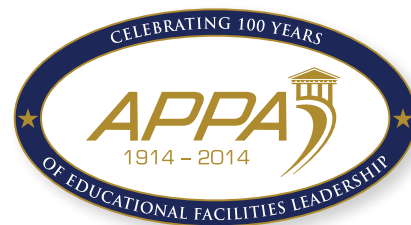
Director – Gerald Hawk, Eastern New Mexico University, 1970-1972

1 First (Permanent) Association

Executive Director – Paul T. Knapp, 1972-1985

A Sampling of APPA FIRSTS

By Steve Glazner, Editor



5

First Senior Facilities Officer Summit

2007, Baltimore, Maryland

5 First Emerging Professionals Summit

2013, Minneapolis, Minnesota

6 First APPA Fellows

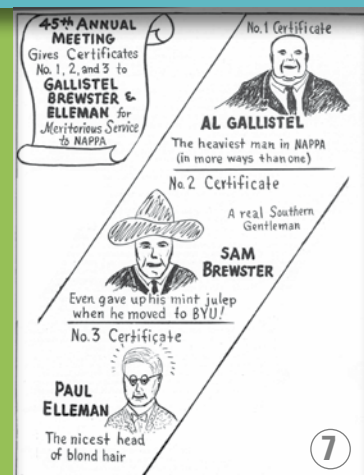
Jack Hug, Doug Christensen, and Bill Daigneau (2004)

7 First Meritorious Service Awards

Sam Brewster, Brigham Young University; Paul Elleman, Ohio State University; and Al Gallistel, University of Wisconsin Madison (1958)



6



7

2 First Female APPA

President – Diane Kerby, Berea College, 1993

3 First African American Member Elected to APPA Office

– William McDonald, North Carolina Central University (Treasurer, 1989)

4 First African American Member Elected President-Elect

– Randolph Hare, Washington and Lee University, 2013. Will become APPA's first African American President at APPA 2014 Centennial Celebration



First APPA Facilities Workshop

1959, evolved into the Institute for Facilities Management

First Institute for Facilities Management – 1980

First Executive Development Institute

– 1988, evolved into the Leadership Academy

First APPA U – September 2011, combining full 4-track programs of the Institute and Academy under one roof

First Drive-In Workshop – May 2010, Metropolitan Community College of Kansas City (sponsored by Tandus Flooring)

First EFP Recipients – September 2007: 15 APPA members earned the first APPA credential

First CEFPP Recipients – January 2009: Allen Boyette, Alan Daeke, Terry Fenstad, Kenneth Klika, and Tom Shewan

First APPA Conference in a Region—

MAPPA (First APPA Meeting) – March 23, 1914, Chicago, Illinois (University of Chicago)

ERAPPA – 1928, Ithaca, New York

RMA – 1929, Denver, Colorado

SRAPPA – 1930, Lexington, Kentucky

PCAPPA – 1940, Seattle, Washington

CAPPA – 1946, Lincoln, Nebraska

First APPA Conference in Canada – 1962, Hamilton, Ontario (McMaster University)



8 First Rex Dillow Award for Outstanding Article

Doug Christensen, 1987, with Phil Rector (left), and Rex Dillow (right)

9 First Award for Excellence in Facilities Management

Brigham Young University and Medical College of Georgia, 1988







Empowering *Facilities Teams Through* Technology

By Scott Cormier

Facilities departments at colleges and universities are facing the same challenge: how not to do just the *most* projects, but also the right projects with the limited funds they are given. In order to make the best decisions, they need more control over the capital planning process, which requires accurate, current facility condition data. Each educational institution needs to find the right approach to collecting and maintaining their facility data. Times are changing and so are the methods for facility condition assessments.

Whereas in the past many colleges and universities have had facility condition assessments performed by third-party providers, today they are turning to modern technology to perform their own facility assessments. Dalhousie University, James Madison University, and Florida International University have adopted new processes and technology that enables self-sufficient facility teams to stay on top of pressing issues and maintain an accurate database of information.

With campuses located in the heart of Halifax and the picturesque town of Truro, Nova Scotia, **Dalhousie University** is a leading, research-intensive Canadian university offering more than 180 degree programs in 12 diverse faculties. Dalhousie has more than 18,000 students and 5.5 million square feet of facilities with a replacement value of \$1.8 billion.

Dennis Gillis, P.E., assistant director of planning at Dalhousie, observed the challenges that come with a lack of insight into building condition. “In the past, if we weren’t actively doing work on or in a building, we had no insight into the condition of the building since its last assessment,” he said. “Only the buildings with active projects had updated information, even though the condition of non-targeted buildings was still changing.” Another result of stale data faced by the facilities team was a lack of credibility with university leadership. Said Gillis, “Questions from management were difficult to answer because we had to acknowledge that reports were based on outdated data.”

As with most universities, Dalhousie had too many projects to do and not enough funding. It needed current information in order to make strategic decisions.

Dalhousie used a combination of existing data from various sources, brought into a centralized database and facilities capital planning tool, and data gathered by its own staff to gain fresh insight. A mobile tool that guides facility managers through a standardized assessment process is an efficient and cost-effective way to keep facility condition data up-to-date. Assistant planners assign facility surveys to operational supervisors, who conduct the assessments using a data collection tool on Apple iPads® for consistency and speed. The assistant planners then review and approve the survey results, which are uploaded to the database and used to prioritize and plan projects for the next fiscal year.

Among the results is that operational supervisors feel ownership—they are the building custodians and have a very real stake in the outcome of the audits. This gives them a role in the capital planning process. Operational supervisors liked the concept of getting involved in providing information to decision makers, and the decision makers take the analysis as fact because the operational supervisors start with so much building knowledge. Gillis commented that “conducting our own assessments has enabled my team and our management to regain confidence in the data.”

One of the challenges faced by public universities is that they must abide by government regulations in order to obtain funding.

James Madison University (JMU) is a public university in Harrisonburg, Virginia, and one of the top public schools in the United States. The university was founded in 1908 and has more than 19,000 students enrolled and more than 6 million square feet of facilities. JMU needed to meet mandates from the commonwealth in order to obtain funding, but also wanted to keep data current to improve decision making for its own benefit. Conducting facility assessments with existing staff lets JMU keep up with a growing facility portfolio and better comply with state mandates.

JMU divides facility condition surveys and assign them to three inspectors, who get real-time information that allows them to address questions on the spot, and update data instantly rather than

spending time in the office importing data. Charles Grimm, property inspector/assessor supervisor, has seen the benefits of a software solution for his staff. He observed, “Doing our own assessments with this guided process allows us to get ‘shop’ buy-in, and to involve those who know the facilities well.” And, when a facility employee leaves, Grimm is able to use other staff members who can easily follow the embedded process in the mobile software.

JMU’s use of a mobile tool for facility condition assessment has reduced office time from two weeks to two days, and the facility team has surveyed four times more square feet. For the JMU facilities team, this means considerably less time uploading data and more time in the field acting on the information.

JMU has moved from a five-year to a three-year cycle to update facility condition information. The increased frequency of assessments provides more accurate data for potentially costly investment decisions. Grimm noted that originally it was overwhelming to keep up with the three-year cycle of assessment requirements, but moving to the mobile tool has helped them keep pace. They now collect condition data on 50 percent of their residence halls each summer.

Meanwhile, **Florida International University** (FIU) wanted

to move to a life-cycle asset management approach. FIU is located in Miami, with 47,000 students on three campuses. FIU has 8.2 million square feet of facilities, with another one million square feet under construction.

According to Marco Benitez, director of analysis, assessment, and risk management, a life-cycle asset management approach boils down to “how we use our limited resources (people and dollars) to fix an unlimited amount of needs so our buildings don’t fall apart and the users don’t complain.” The goals for life-cycle asset management were to prioritize the right facility issues and increase planning “precision,” using the most up-to-date data to make more accurate and appropriate planning decisions; to increase funding with a reliable capital planning strategy; and to create a self-sufficient and repeatable program that supports a long-term planning strategy.

Credible capital planning is born out of having a solid grasp of the facility details, something a



Proactive vs. Reactive Facilities Management

Budgets have been getting tighter across the board, and this is especially felt within facilities management in higher education. Every dollar is squeezed. Each penny is pinched. Funding for renovations, repairs, and maintenance has been waning over the years. To succeed in such an environment, educational facilities managers have to adapt.

And how are they doing that? By being proactive.

How can I be proactive?

There are three main capabilities that result in proactive facilities management:

Leverage facility resources. Nobody knows your buildings better than your facility teams. Using them to gather facility condition data lets you bring their knowledge to the fore.

Standardize the data. It’s critical to standardize the data as it’s collected. This makes it possible to compare facility conditions, identify problems within your campus, and prioritize projects.

Have your data available. Having facility condition information readily available in a centralized online database allows you to make on-the-spot, informed decisions. If and when you have to deal with changes like funding cuts or an emergency, then you can re-prioritize and allocate budget accordingly.

self-sufficient assessment program generates. Benitez observed that all decisions are based on some type of data, and the key is, "Be at the right time in the right place...with the right information." FIU needed to identify both immediate maintenance needs and long-term capital investments, prioritize competing requirements in a transparent and fair process and rely on data-driven decision making.


Since FIU will not be able to get funding to hire an outside firm for a facility condition assessment every year, it became imperative that the university uses existing staff to keep the most recent assessment data current. Benitez wanted a repeatable system that would instill a process of data collection and maintenance, not a one-time event. Using a guided data collection solution, he took a static process and created an ongoing way to keep data dynamic and relevant.

Benitez is an advocate of ensuring that upper management understands the benefits of a strategic facilities capital planning program. "They will see the value of being able to call and get an accurate answer in a timely manner because data is current and available," he said.

Educational facilities departments are looking for the right approach to obtain and maintain current facility condition data—one that meets their needs and budgets. When budgets are tight, facility managers need to effectively manage their campus facilities and make smarter capital planning decisions. Yet, it is challenging to prioritize capital projects with incomplete, inaccessible, or dated facilities condition information.

Technology is transforming the way facilities managers are planning for and managing their capital investments. It enables facility staff to take control and turn data into credible, winning funding requests. Facilities managers can leverage existing facility staff knowledge with proven best-practice guidance, ensure consistent data across an entire portfolio with a standardized process, and use the latest mobile technology to improve speed and accuracy. Fresher data enables better decisions and gives facilities teams credibility. It's also possible for facilities managers to easily set up a recurring facility assessment schedule to avoid "stale" data. Frequent updates more accurately reflect the most pressing issues, resulting in better capital planning decisions.

Facilities managers today are empowered to get the funding they need by making funding requests based on accurate data they have gath-

ered themselves using a standardized process. Their decisions help their schools to provide the best learning environment for students, faculty, and staff. 

Scott Cormier is senior director of product management, VFA, Inc., a Boston-based provider of end-to-end solutions for facilities capital planning and management; he can be reached at scormier@vfa.com. This is his first article for *Facilities Manager*.

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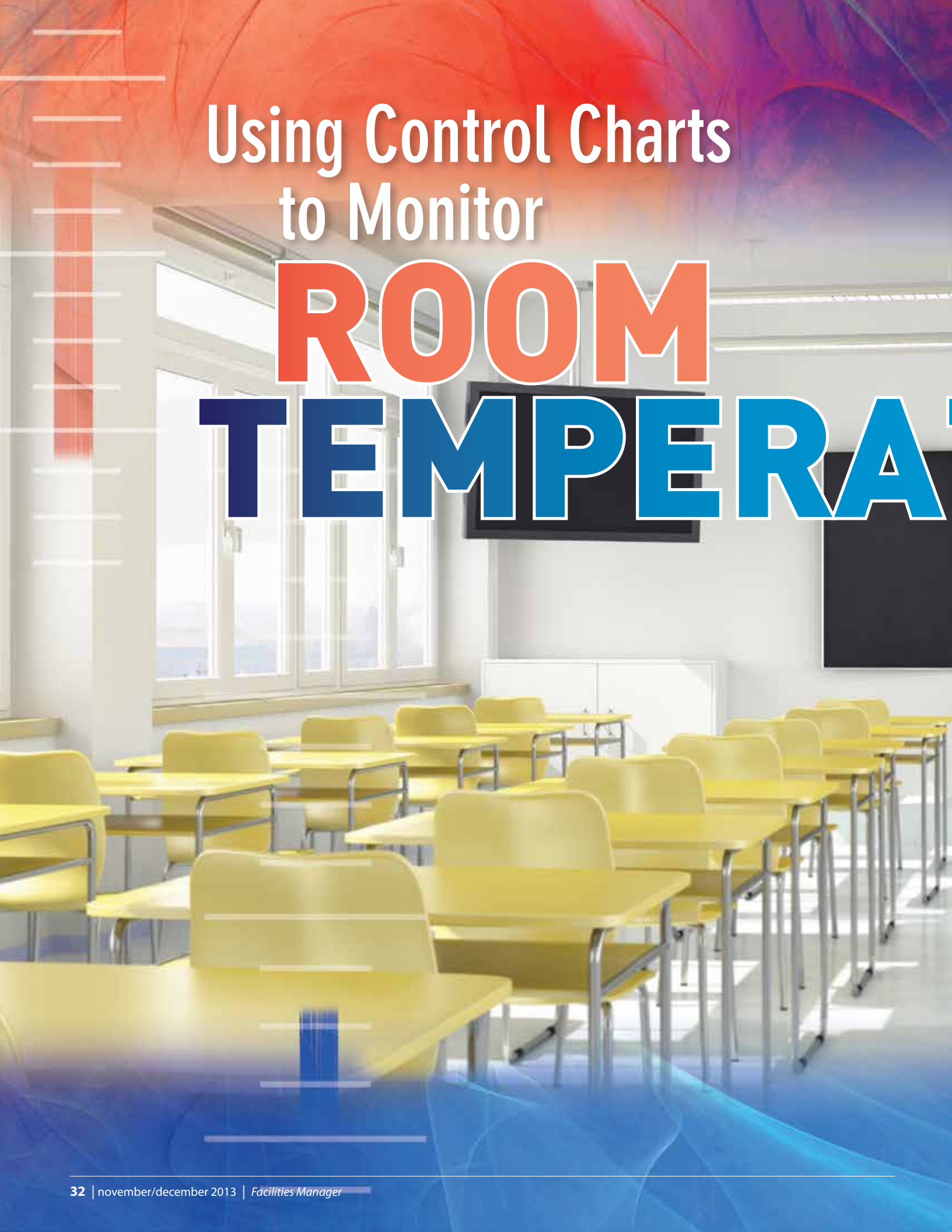
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Using Control Charts to Monitor **ROOM** **TEMPERATURE**



by Albena Ivanova
and Scott Albert

In 2009, Slippery Rock University in Pennsylvania installed a new Building Automation System (BAS) to monitor and control the room temperatures. The system takes temperature readings in multiple spaces. When the outside temperature rises above 60 degrees, the air-conditioning mode is activated. When the outside temperature drops below 50 degrees, the heating mode is activated. When the outside temperature is between 50 and 60 degrees, the system is in “neutral” mode. Even though the system allows predetermined setpoints, the actual temperatures in many spaces was much lower or much higher than the setpoints.

ATURE The Case of Slippery Rock University

The university was incurring high heating/cooling costs due to lack of control in the building HVAC systems. This project aimed to determine whether the space temperatures were in control and to identify ways to avoid unnecessary heating or air-conditioning costs.

DATA COLLECTION AND ANALYSIS

The project started by visually inspecting all spaces, taking pictures of the factors affecting the temperature, and recording users' satisfaction with the room temperature. BAS contained historical data on the daily temperature readings, taken every 15 minutes for 12 months. BAS also contained the individual spaces current setpoints used as specification limits. For example, if a room setpoint was 72 degrees F, the specification limits were 72 +/- 2 degrees, resulting in lower specification limit (LSL) of 70 degrees F and upper specification limit (USL) of 74 degrees F. Figures 1 and 2 represent the s-chart (daily standard deviation) and the \bar{x} -chart (daily average) for the Choral Room June temperature.

Next, we computed the process capability indexes revealing if the process is capable of meeting the specifications.

RESULTS

Analysis reveals several situations:

- *Process in-control and capable (~2% of the cases).* No need for change.
- *Process in-control but not capable (~13%).* Look at Choral room (Figures 1, 2, and 3). Two options exist: reduce the process standard devia-



tion, and revise the specification limits. In the Choral room case, revision of the limits is a preferable solution, as this will not affect the customer satisfaction. The Choral room is spacious and used by many people. If the tolerance is increased from 2 to 3 degrees, the process will be almost capable ($C_p = 0.91$, $C_{pk} = 0.84$) and with higher customer satisfaction.

- *Process out-of-control due to identifiable special cause (~49%).* The process is out of control due to three main causes: turning the HVAC system off during the weekends: turning it off during the holidays; and high variability in external temperature. Figures 4 and 5 illustrate the situation when the temperatures go above the upper control limit every seventh day. In July, the facility turns the air-conditioning units off for the weekend, as the classroom is unused. The weekend readings during unoccupied times should be removed from the analysis and new control limits calculated.

Figures 6 and 7 illustrate similar situations with average temperatures on January 1, 2, and 3 way below the lower control limit.

Figure 1. Daily standard deviation (s-chart) of the Choral Room June temperature

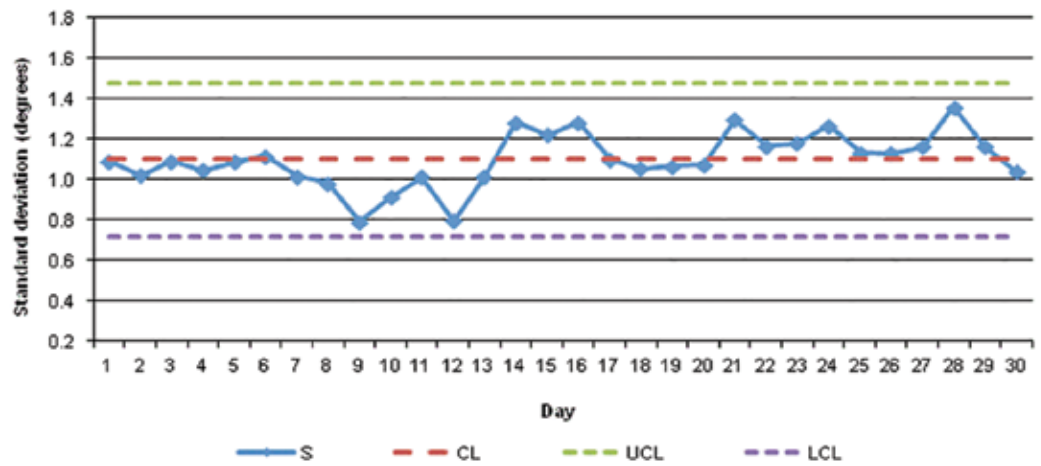


Figure 2. Daily averages (\bar{x} -chart) of the Choral Room June temperature

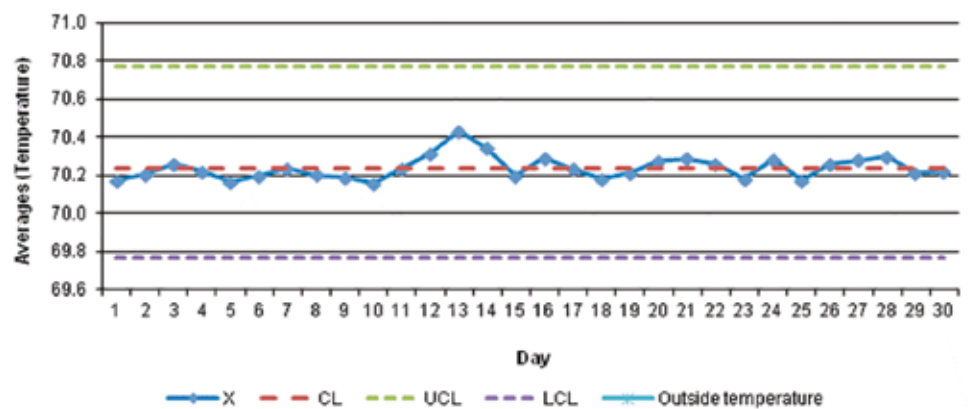


Figure 3: Process Capability of the Choral Room June temperature

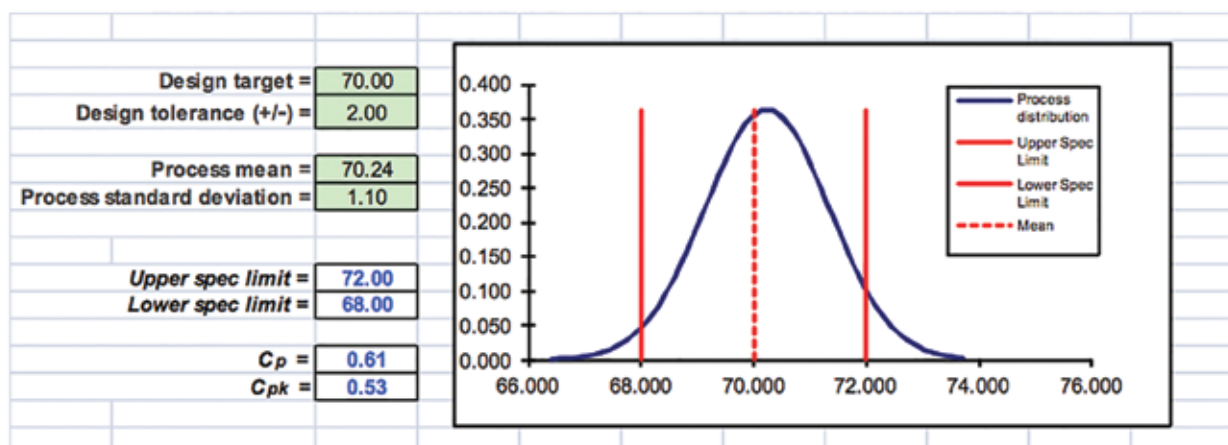


Figure 4. Daily standard deviation (s-chart) of the Classroom July temperature

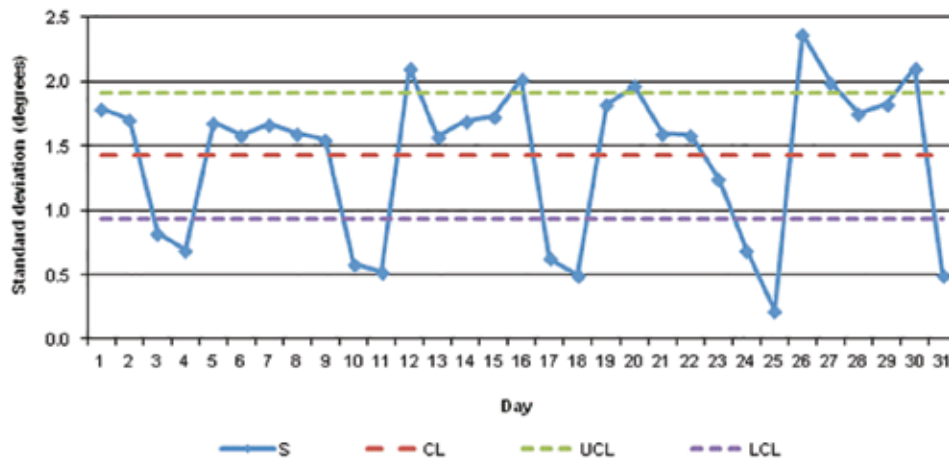


Figure 5. Daily averages (\bar{x} -chart) of the Classroom July temperature

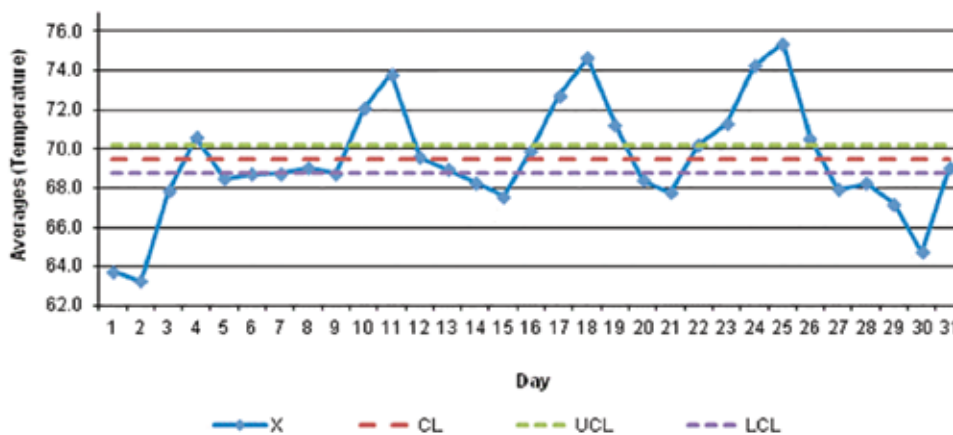
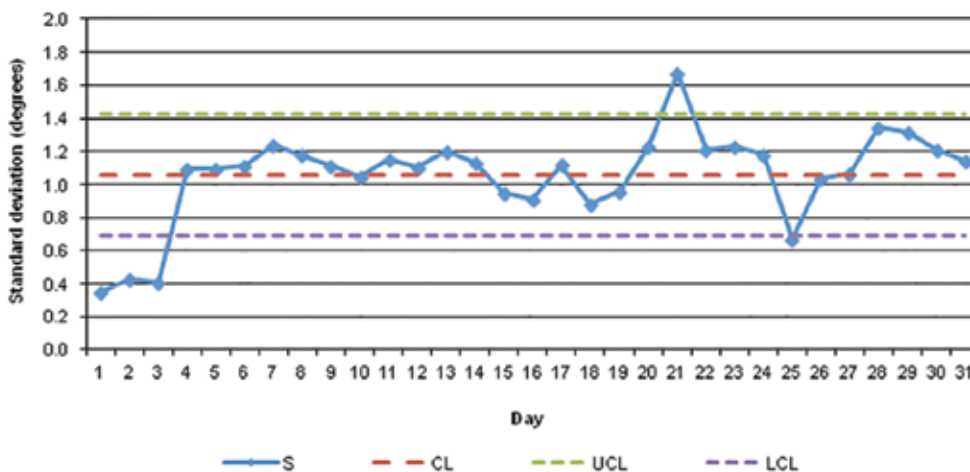


Figure 6. Daily standard deviation (s-chart) of the Alumni House January temperature



During these days, the university was closed for the winter break and the heating was turned off. These three-day readings should be removed from the analysis and new control limits calculated.

Figures 8 and 9 present a situation where the temperatures are out-of-control due to rapid changes in the outside temperature, usually during the spring and fall months. One may argue that the outside temperature is not a special cause, as the goal of the heating/air-conditioning is to keep the inside temperature constant despite the outside temperature amplitudes. Internal and external temperatures, however, are highly correlated. That is why high external temperature amplitudes are a special cause.

Adjusting the process during these months is difficult, as the heating/air-conditioning units are set up to respond to the changes in external temperature. The situation is even more complicated when the system transitions back and forth between heating and cooling modes.

- *Process out-of-control due to unidentified special cause (~36%).* Figures 8 and 9 illustrate that the Auditorium November out-of-control temperatures are not related to the outside temperatures. Management needs to investigate and correct the problem. Common problems include power outages (requiring restarting the variable frequency drives controlling the air-handling unit fan motors) or building air compressor (provides control air) failure.

Approximately, in 85 percent of the cases the temperature was out-of-control. In three spaces, room temperatures were higher than the setpoints. In one space, temperatures were lower than the setpoint. In four spaces, temperatures were outside the specification limits.

The winter break, with the HVAC



systems turned off, forced the January room temperatures out-of-control. High outside temperature fluctuations forced April and May room temperatures out-of-control. The cooling/heating modes come from the same system but are activated depending on the outside temperature. High outside temperature fluctuations cause high inside temperature fluctuations as the system goes back and forth from cooling to heating mode. Similarly, in June, high outside temperature fluctuations and the HVAC system off during the weekends lead the process out-of-control (above the upper control limit).

In July, the air-conditioning is turned off during the weekends, resulting in out-of-control temperatures (above and below the control limits). In August, low occupancy and HVAC system turned off at different times, forced temperatures out-of-control. In September, when the classes resume, the temperatures go out-of-control due to the system adjusting to the weather changes. In October, the temper-

Figure 7. Daily averages (\bar{x} -chart) of the Alumni House January temperature

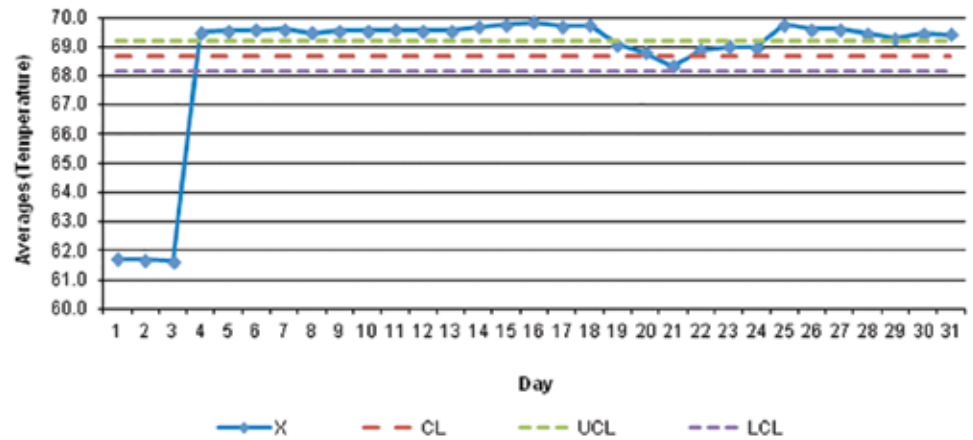


Figure 8. Daily standard deviation (s-chart) of the Band Room May temperature

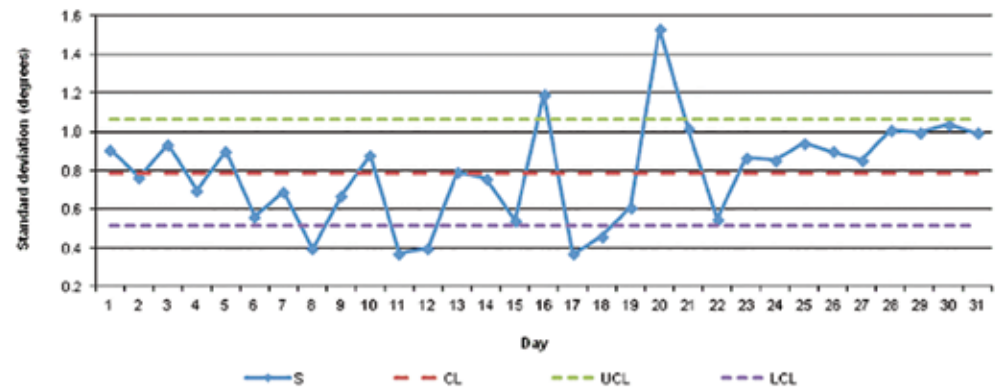


Figure 9. Daily averages (\bar{x} -chart) of the Band Room May temperature (outside temperature readings are listed on the second axis)

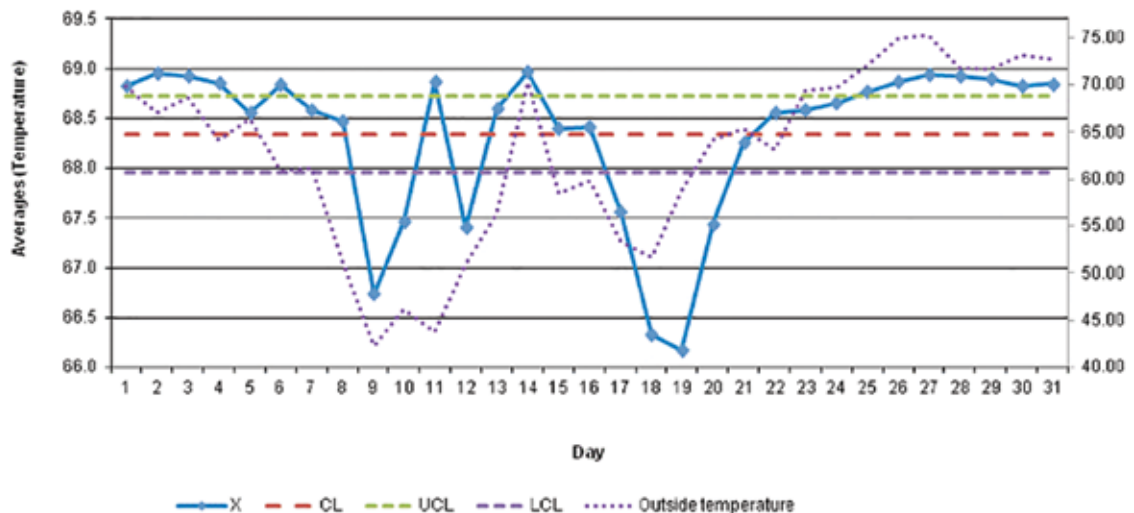


Figure 10. Daily standard deviation (s-chart) of the Auditorium November temperature

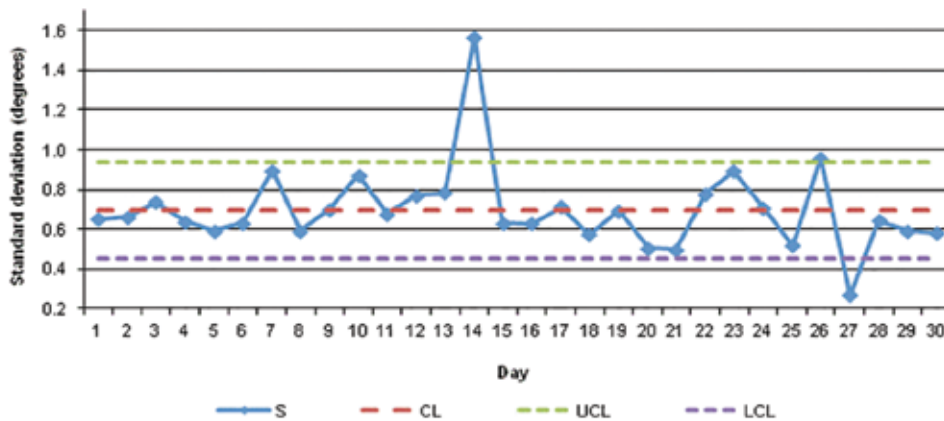
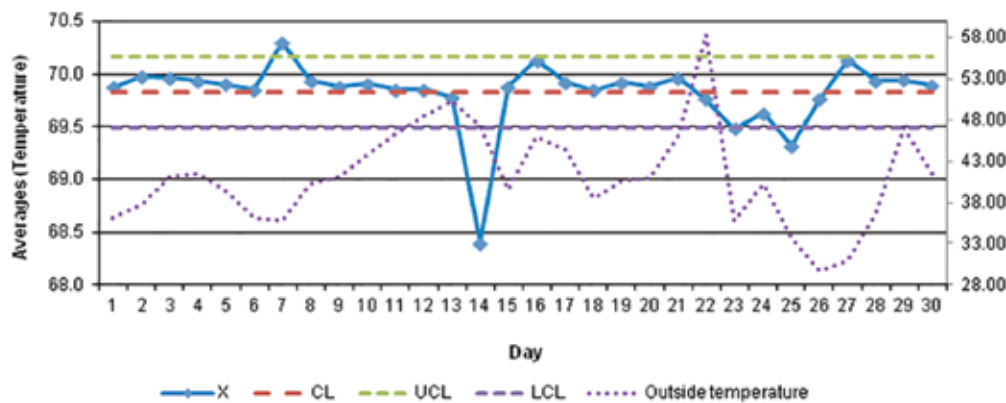


Figure 11. Daily averages (\bar{x} -chart) of the Auditorium November temperature (outside temperature readings are listed on the second axis)



atures are out-of-control and much lower than the setpoint. In November, the temperatures are out-of-control and much higher than the setpoint. In December, the temperature is again out-of-control, due to turning off the heating during the weekends.

RECOMMENDATIONS

Based on the analysis, we made the following recommendations:

- A. *Process standardization.* The setpoint for the Meeting room 1 was 74 degrees and for Meeting room 2 was 70 degrees. The more consistent the setpoints, the easier the process control.
- B. *Tolerances.* Many of the control charts were out-of-control, much higher or lower than the specification limits, because of the narrow specifications limits. When the specification limits are set with one-degree tolerance (Auditorium and Classroom), increase the tolerance from one to two degrees. Small increase in the tolerance, irrelevant to the customer, will make the process capable.

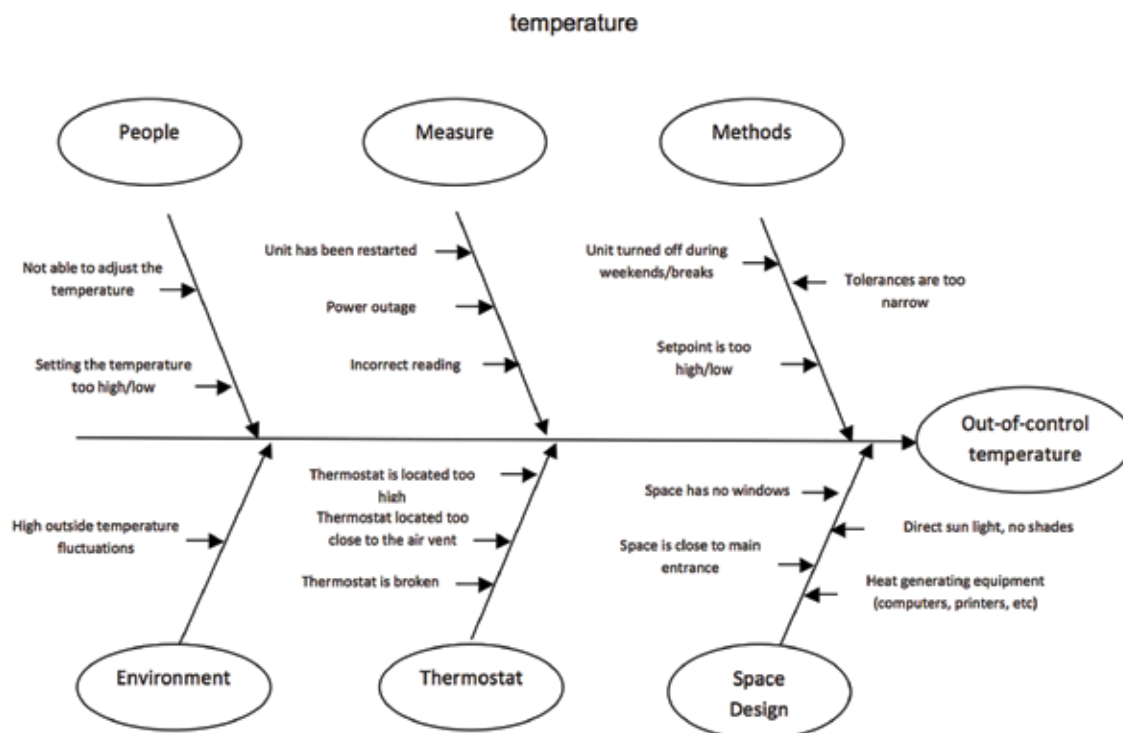
C. *Process mean higher than the specification target.* When the process mean is higher than the specification target, reset the setpoint. For example, Library reading room temperature was consistently much higher than the setpoint of 72 degrees. It is a closed space, with no windows, with computers and a printer constantly in use, generating a lot of heat, making the space hot and uncomfortable to use. Reducing the setpoint to 70-68 degrees will partially solve the problem, as the heat around the space during the heating season is enough.

D. *Process mean lower than the specification target.* Similarly, for those spaces where the process mean is lower than the specification target, the setpoint could be reset based upon occupancy. Meeting room 1 had temperatures much lower than the specification limit, especially during the summer months. The setpoint was 74 degrees, but the room was kept much colder with the air-conditioning running at full power, even when the space was not in use. Similarly, the Classroom was

not in use during May, June, July, and August but had a cooling setpoint of 70 degrees. In this particular case, the university is wasting money cooling an unused space. Either reset the setpoint to higher temperature, based upon room occupancy, or turn the unit off when the space is not in use. Shade the windows to block the sun during the summer months.

- E. *Redesigning spaces.* Cafeteria is a large space, with an automatic door at the main entrance. The door is constantly open as people go in and out. Outside temperature impacts inside temperature, making the place cooler in winter months (December) and warmer in summer/fall months (June, July, August, September, and November). Employees are using individual electric heaters to stay warm during winter months, causing higher inside temperature fluctuations and incurring additional costs. One possible solution is installing an air curtain serving as a shield against the cold blast coming in through the doors. Solution that is more expensive

Figure 12. Cause-and-effect diagram (Fishbone) for the causes of out-of-control temperature



is redesigning the exterior entrance so the west wind is not entering the lobby when people enter the building. Placing window shades will also reduce the sun impact and improve the temperature control during the summer months. Similarly, Meeting room 2 is exposed to outside airflow through the entrance doors, resulting in the process being out-of-control all the time. Adding a second set of doors could improve the temperature control in this space.


- F. Allowing users to adjust the temperature.* In several spaces, the thermostats were either broken (Classroom) or deliberately removed (Meeting room 1) to limit the users control over the temperature. The idea was to prevent people adjusting the setting and interfering with the room temperature control. Allowing the Classroom users to reduce the temperature in November, however, would have saved the university money on heating.
- G. Consider the thermostat location.* The thermostat location tremendously affects the readings. For example, the Library reading room thermostat is located directly under the air vent. The Alumni house offices thermostat is located high on a wall picking up the warmer air in the room, resulting in readings that are higher than the temperature that people actually feel in the room. When not practical to change the thermostat location, consider it when determining the room setpoints.

Finally, to illustrate better the causes of the out-of-control temperatures, a cause-and-effect (Fishbone) diagram is presented on Figure 12. The causes are classified in different categories:

People, Measures, Methods, Environment, Thermostat, and Space Design. It may not be possible to control the outside temperature (Environment) or to change the Space Design, but the rest of the categories provide opportunities to improve room temperature control.

CONCLUSION

The fact that most of the charts were out of control requires reevaluation of the factors affecting room temperatures, process standardization, and redefining the setpoints and tolerances of the system. Given the complex nature of the task and the numerous factors impacting room temperature, it is advisable to first evaluate common spaces and to reevaluate them annually to reflect any changes in usage and space design. As this was the first time the facility analyzed temperature readings, the study became a pilot one for further analysis.

Monitoring room temperatures provides useful insight into the process and identifies ways to improve customer satisfaction and save money at the same time. We believe that the methodology of the analysis and the results could be used by other facilities at different institutions. 

Albena Ivanova is an associate professor in operations management at Robert Morris University, Moon Township, PA; she can be reached at albena.iossifova@gmail.com. Scott Albert is director of facilities at Slippery Rock University, Slippery Rock, PA; he can be reached at scott.albert@sru.edu. A longer version of this article first appeared on *Engineered System's* website at www.esmagazine.com.



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VFDs

Are they Electrical Parasites?

Since Nikola Tesla applied for patents in 1888, the induction electric motor has seen a number of changes. In the past 100 years the electric motor has been scrutinized and reconfigured many times to create an extremely efficient workhorse that transfers electrical energy into mechanical energy.

Let's look at a typical example of a 100 hp motor running in an area that has an average cost of \$.10 per kilowatt hour. In this example our 100 hp motor is 95 percent efficient but runs straight across the line 24 hours a day, 365 days a year. Just to keep this motor fed with electricity, the annual cost will be about \$46,000 per year.

The Variable Frequency Drive (VFD) has an important beneficial role as it has the ability to modulate the speed of the motor and the amount of power the electric motor uses. Thus the motor only consumes the amount of power needed to keep the application running. Unfortunately, there are also some detrimental problems with the technology that may cost the facility unless the technology is understood and deployed correctly.

By Ned (Scott) Frank

WHAT IS A VFD?

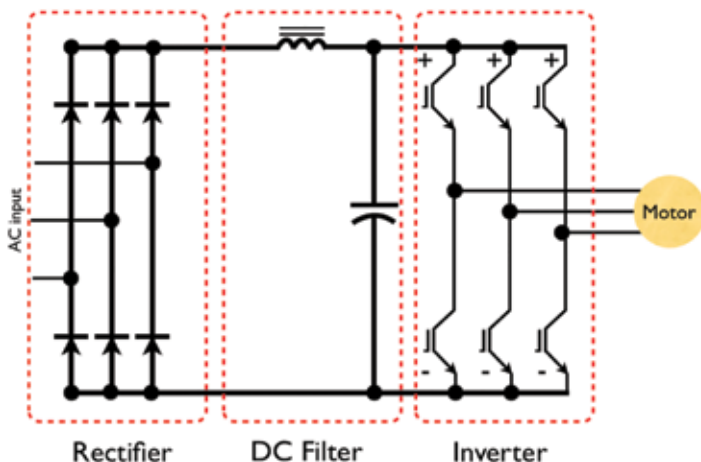
VFDs are electronic speed controllers used mainly to modulate and reduce the overall speed and power consumption of an electrical motor. They can be used as soft starters for equipment that has a large rotational mass, thus reducing belt wear and large electrical peaks when starting large pieces of equipment. VFDs have other options that are useful like capturing a reverse spinning loads prior to start up, and they can also be used to over speed a motor for specific applications such as fan walls.

Pulse Width Modulation (PWM) VFDs have three basic components (Figure 1). First there is a “Rectifier” section, then a “DC Filter” section, along with an “Inverter” section.

The rectifier is a set of diodes that changes the incoming AC into DC. The DC voltage is then filtered in the DC Filter section to remove the ripple from the rectifier. The DC voltage is then used to power a set of switching transistors called the Inverter.

The inverter is a group of Insulated Gate Bipolar Transistors (IGBT) that have high switching speeds. They are transistors that turn on and off for varying durations of time, sending an output to the motor at a different voltage and frequency than the incoming signal.

Figure 1.



An important concept is that motors have to maintain a fixed voltage to frequency ratio in order for it to work properly. For example, if a motor was running at 120 volts 60 Hz 1,750 RPM, and our application needed to be run at half speed of 875 RPM, we would not only need to reduce the voltage by half to 60 volts, but we would also have to reduce the frequency to 30 Hz to maintain the voltage to frequency ratio.

HARMONIC DISTORTIONS

The Rectifier portion of the drive creates some unwanted anomalies known as harmonic distortions. Harmonic distortions are basically unwanted electrical feedback into the buildings power system or incoming electrical utility. Harmonic distortions can lead to mysterious equipment failures, voltage sags, or spikes within the building, which can affect adjacent applications. They can also be responsible for equipment having intermittent problems.

Rectifiers use a number of diodes that, when forward biased, pass current in only one direction, allowing the circuit to seemingly to flip the negative cycle of the incoming sine wave and make it positive.

Looking at the diagram of a simplified bridge rectifier (Figure 2), we can see that as the positive half cycle of the sine wave (in green) forward bias the green diodes, turning them on and allowing electrons to flow through the resistive load. The red diodes are turned off for the positive half cycle impeding electron flow to the resistive load.

On the negative half cycle (Figure 3), the red diodes are now forward biased and the green diodes are turned off, allowing electrons to flow the same direction through the resistive load. The result is a full wave rectified signal applied to the output of the circuit.

We found that if a capacitor was added to the output of the rectifier (Figure 4), the DC ripple could be greatly reduced. The

Figure 2.

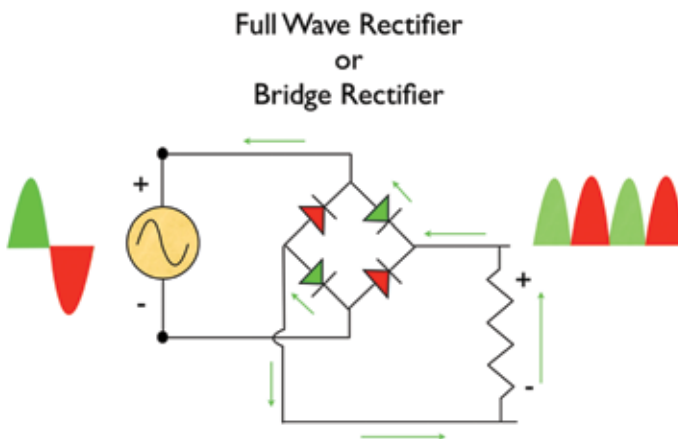


Figure 3.

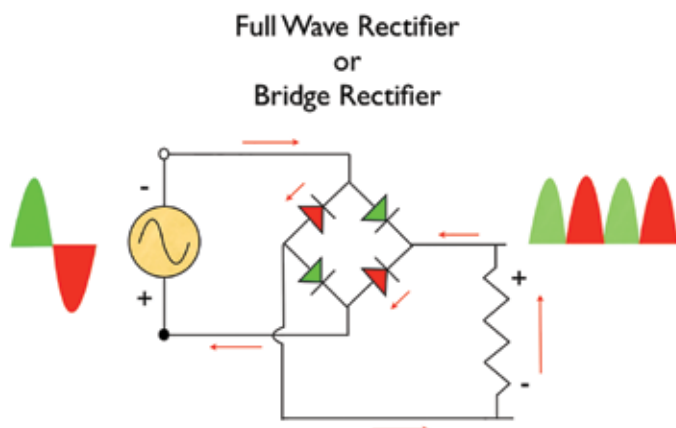
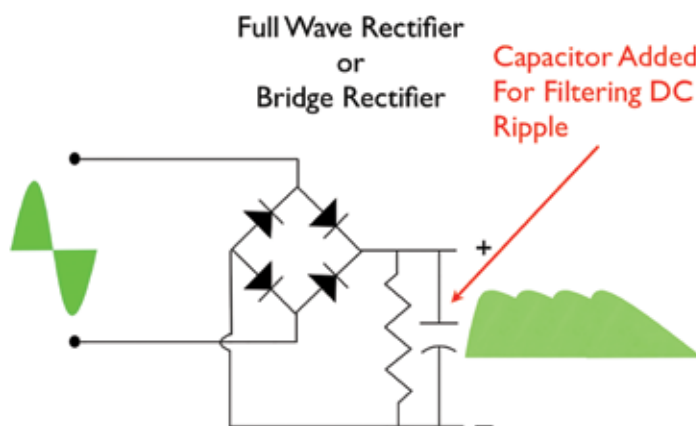


Figure 4.



capacitor of the right size would initially charge but not have the ability to discharge due to the increase of the Resistive Capacitive Time Constant, thus smoothing out the output wave form.

The electrical switching back and forth in the rectifier circuit is what causes anomalies back feeding into the incoming power. It is much like water hammer when you immediately shut off the flow of a running faucet. The backlash of the shock wave is pushed back up stream and felt as water hammer in the piping; a similar thing happens to the electrons as they switch from positive to negative cycles through the rectifier circuitry.

One solution is to apply line reactors (basically a coil of wire), on the input side of the variable frequency drive. These can be used to trap the shock waves from the rectifiers circuitry before they could be back fed into the building's electrical system.

LOOP GROUNDS

Loop grounds are simply two or more different points of grounding in the building's electrical system, akin to having the VFD electrically grounded to the building electrical system, and the motor grounded to building steel or the plumbing system.

Loop grounds can cause electrical noise in the building and other problems with the VFD's microprocessor. This electrical noise can also cause problems with computers such as the BAS system and other sensitive equipment associated with research. Loop grounds can also be attributed to bearing failures in the motor, as they can set up circulating currents in the motor causing electrical erosion or fluting of the bearing.

LENGTH OF CONDUCTORS FROM THE DRIVE TO THE MOTOR

Each conductor is basically a series of resistive capacitive and inductive circuits that create impedance to the speed of the pulses that are being fed to the motor.

Figure 5 shows the output of a single phase of the drives inverter circuit, one can see that the drive is trying to simulate a sine wave by creating short pulses that are varying in amplitude and time duration. The switching speed of the drive is more commonly known as the carrier frequency.

The carrier frequency can wreak havoc in leads that are too long as the signal can react with the impedance of the cables, producing resonant frequencies. This is like snapping a bullwhip that is tied to a fence post—the outgoing pulse either hits the motor and damages the stator windings, or it is reflected back to the drive causing damage to the IGBTs.

MOTOR STATOR PROBLEMS

As an incoming sine wave excites the motor's stator, a magnetic field is produced at each of the motor's poles that expands and contracts "smoothly" at the same rate of the incoming amplitude and frequency of the incoming signal.

However, when the motor receives an input signal that is not sinusoidal, the effects can be detrimental for a number of the motor's components. PWM technology produces an output waveform that is a pseudo sine wave. It is creating an output waveform that is a series of pulses varying in amplitude and duration (Figure 5), that when reconstructed, is trying to emulate a sine wave at the drives output.

The output signal is chopped up much like a tree branch that went through a wood chipper. The motor then has to somehow reconstruct all the pieces and use them to excite the magnetic

Figure 5.

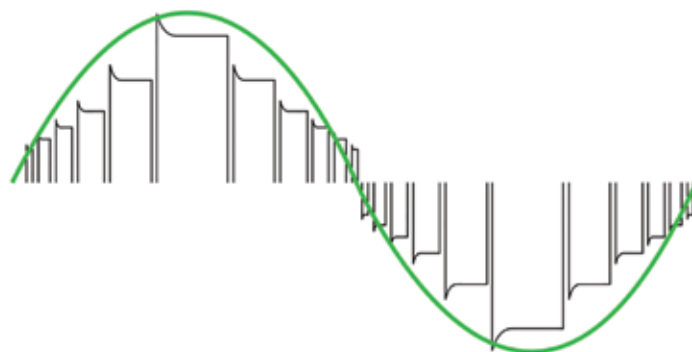
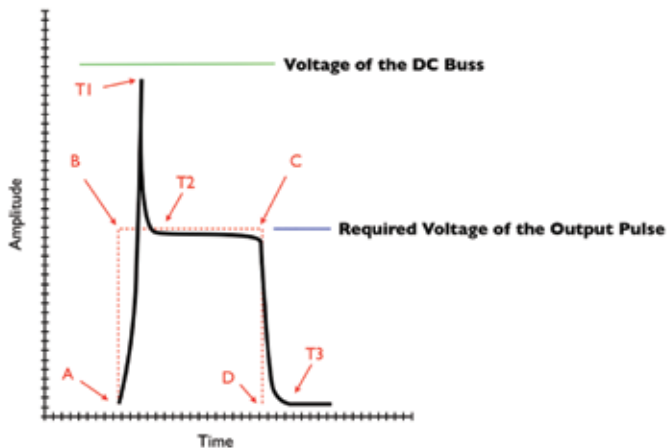


Figure 6.



field of the the stator. The result is a number of problems, one being the motors flux fields do not expand and contract smoothly, causing the stator windings in the motor to vibrate. The vibration over time will eventually cause the windings to fail.

MOTOR BEARING PROBLEMS

The red dotted line (Figure 6) A,B,C,D is the outline of the square wave output the IGBT is trying to make. But electrically

it is impossible for the IGBT to react fast enough to produce a signal that comprises right angles.

As the IGBT turns on at point A, it immediately opens the gate to the DC buss allowing high voltage to flow to the output. The IGBT then tries to limit the voltage at point B. Because the rise time from point A to point B is so fast (typically in micro seconds), the IGBT allows a short spike of high voltage from the DC buss to pass to the output (identified here from point A to T2) essentially overshooting the desired voltage of the required pulse. The IGBT then tries to shut off at point C, but because of the lag time, it actually over shoots the actual desired shut off point of the gate. The switching actions required of the IGBT happen incredibly fast, unfortunately not fast enough, as the motor sees all the information in the output wave form (Figure 5).

The motor has no idea what to do with the high voltage spikes shown in Figure 6. As the pulses cut the windings of the motor they produce flux field anomalies that cause eddy currents build up on the rotor and a slight voltage is produced. This may be as low as a half volt or as high as five volts. The currents want to flow to ground, and the easiest path is often through the bearing.

As the voltage builds up on the rotor it eventually overcomes the insulating properties of the thin film of lubrication between the ball and the bearing races. Small electrical arcs are produced

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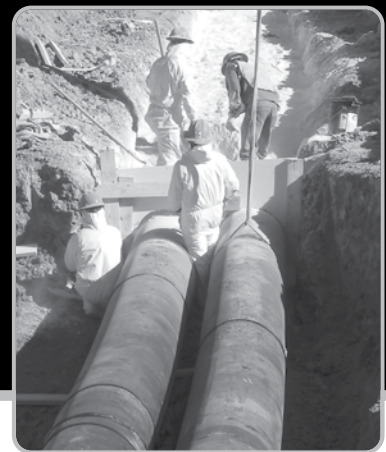
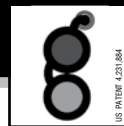
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creating a microscopic weld in the substrate of the bearing (Figure 7).

A closer look at the edge of the electrically eroded area with a scanning electron microscope (Figure 8) shows that the damage to the bearing substrate is severe.

An even closer look (Figure 9) is the same sample magnified 10,000 times. One can clearly see that the arc not only produced a significant pit in the substrate, but the metal was hot enough that it left small puddles of material on the surface of the bearing substrate. This could have been lifted from the substrate of the race, or it could have been material from the ball bearing as it passed the point where the micro weld was created.

WHAT DOES THIS MEAN?

In a typical ball bearing application there is a small almost microscopic pressure wave that precedes the actual ball as it rolls forward in the race capturing the load of the rotating application. (Figure 10) is exaggerated so that the reader can see the pressure wave. The pressure wave is created by the force applied either due to the weight of the application on the bearing, or the lateral force applied by tensioning the belts.

The metal substrate of the bearing is extremely hard but also elastic. If the substrate of the bearing is damaged, small cracks or

Figure 7.



Figure 8.



Figure 9.

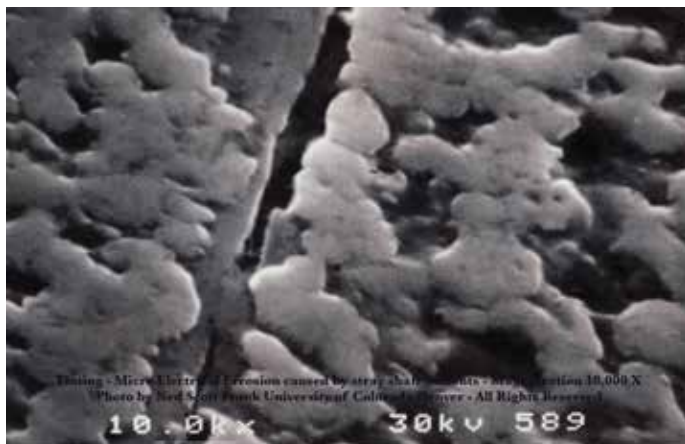
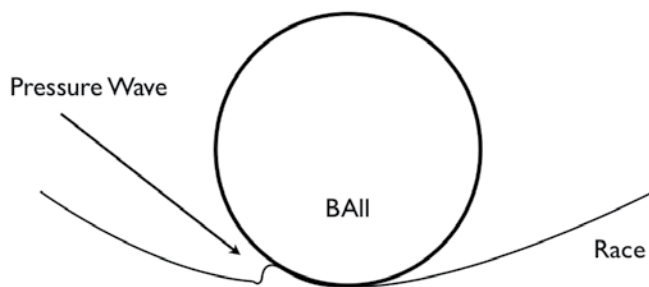


Figure 10.



chips form in the surface and essentially spall causing a catastrophic failure of the bearing.

SHAFT GROUNDING

There is really no “fix” for circulating eddy currents, as this is a phenomenon inherent in the PWM technology. The preferred method of mitigation is to install a shaft grounding kit on the end bells of the motor to create a parallel path for the damaging currents away from the bearings.

Motors can also be ordered with insulated bearings; this can be done a number of ways. The end bells of the motor can be machined and phenolic cups installed in the bearing cups, or ceramic-coated bearings can be installed.

There are problems with insulating the motor bearings in that the charge on the rotor can now be transferred to the belts, much like a Vander Graph generator. The electrons from the rotor create a static charge on the belt as it travels up to the fan bearings, and now instead of the electrical arcs damaging the bearings of the motor, the problem is transferred to the driven apparatus.

VFD OPERATING PARAMETERS

VFDs have certain operating characteristics that should be observed as they are applied to any given application. First the

minimum speed at which the motor is driven should be no less than 30 percent of full speed. Moving the motor at speeds slower than 30 percent of nameplate not only reduces the cooling of the stator, but also puts heavy electrical stresses on the motor windings, as the pulses from the VFD are more defined, this can amplify the strength of eddy currents and accelerate bearing damage.

VFDs also have a window of efficiencies as they are applied to HVAC applications. The bulk of the savings a VFD produces is defined in a window from about 45 percent to about 90 percent of full speed. If the application runs at a constant speed below 60 percent of the motor nameplate speed, than that could mean that the equipment for the application is oversized. Consequently, if the application is consistently running over 85 percent of the nameplate speed of the motor, than it could mean that the equipment is undersized for the application.


SUMMARY

There is no doubt that Pulse Width Modulation Variable Frequency Drive technology is here to stay. The industry has now come to the table and working diligently to find solutions for many of these problems. Because the technology is advanced, even the experts disagree about the causes and effects of some of these phenomena.

The problems described here are only a few of the common issues a facility will encounter with this technology. Take the time to educate yourself and your staff, and the time to evaluate motor failures, cutting a bearings open to find the cause of the failure. Ask why a motor failed multiple times in a specific application.

As with any technology there are trade-offs, and VFDs are no exception. The key here is to look at each application from its inception, through design, installation, and start up. Develop a checklist to make sure that all the elements of the application are being looked at and that best practices are being followed.

Follow advice from not only the manufacturer of the drive, but others as well, and select an equally efficient inverter duty motor. Install good shaft grounding technology prior to start up. Also make

sure that the drive is installed for the right reasons and that it has the capabilities needed to run the applications in the most efficient parameters. 

Scott Frank is manager of certification and training at the University of Colorado Denver, Anschutz Medical Campus. He can be reached at ned.frank@ucdenver.edu, and this is his first article for *Facilities Manager*.

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Starting a Planned Maintenance Program on a Shoestring

By Matt Adams, P.E.

Day-to-day work in the trades can be exciting! For some, the day goes by in a whirlwind as they chase service requests and unplanned failures. Nothing makes an eight-hour day seem like 30 minutes the way “putting out fires” does. Sometimes the customers make it seem more professional than it really is. They are truly grateful when someone is sent to help them with their problem.

Unfortunately, this gratitude is not necessarily a result of our stellar response record, but more a recognition that the maintenance department seems spread too thin and the customer is happy that someone got there as soon as they did! This “conditioning” of our customers does not serve them or our maintenance department. I exaggerate the point to ask one of the most repeated questions in APPA. How can we convert our reactive maintenance operations to a planned and predictable operation? In addition, how can we do this with little or no additional resources?

A NEW PERSPECTIVE

It seems reasonable to assume that if a department is short on resources and in a full-blown reactive mode, moving to a more planned work schedule is impossible without an infusion of staff and materials. However, a participant to the APPA Leadership Academy said recently to the Track III participants, “If you don’t believe we can change anything with what we have to work with, why

even bother to come to these events?” I say amen to that! There is always a new idea or practice that we just have haven’t learned about yet, or tried. Perhaps it’s merely a new perspective. This new perspective is where we will start for this exercise.

If you have a computerized maintenance management system, a simple report or pie chart showing the major types of service requests occurring each month or annually is needed. If this is not available, anecdotal information gathered from reviewing the hard copy records or even the results of interviews with the trade staff. In other words, we need to know what the slices of the pie look like for everything we do each year (e.g. 20% of labor for hot-and-cold calls, 15% for lighting issues, etc.)

For some, seeing the results of this analysis of annual workload can be informative. To others it reinforces what they already knew. Nevertheless, this report illustrates the expenditure of working hours of our most valuable asset, the trade staff. To better manage this resource we must begin to analyze, measure, and redirect this asset. To start this, we use the tool that is

used over and over again in this process, which is the Pareto’s Law (otherwise known as the 80/20 rule.) What are the 20 percent of activities in each trade that require 80 percent of the resources? While not specifically 80/20, there are typically easy trends to identify.

For example, the HVAC show might spend 50 percent of their time on hot-and-cold calls. Pick one or two large trenches each trade. This is where the new perspective starts. Total the hours



and/or cost for hot-and-cold calls per year. Now start with a modest goal for initial and continuous improvement. By modest I mean that this kind of change will be slow and incremental, but will manifest itself with the return on better investment of the HVAC trade resource over time.

As such, a goal of 5 percent of hot-and-cold time is reasonable. You can state it as “during 2014 the HVAC shop with redirect 5 percent of 2013 H/C hours to planned activities, 1 percent in the each of the first three quarters and 2 percent in the fourth.” Redirecting trade hours takes the same kind of discipline required for personal savings. In other words, we must save first and spend later.

The initial 1 percent of activities redirected must be designed and scheduled from the onset. That is to say, for this to work, actionable plans are ready to redirect 1 percent of the H/C resources in the quarter, while at the same time, redirecting those resources to planned maintenance activities that pay the highest return on investment toward our long-term goal of creating a planned maintenance program from an unplanned operation.

A NEW APPROACH

Now let's look at the new perspective. The team meets to try and find ways to free up 1 percent now and 5 percent overall for the year. Keeping mind that small improvements matter, we might start by just analyzing Monday mornings. For most of us this is prime time for hot-and-cold service calls.

Here are some examples of changes but there are many more known and yet to be discovered:

- Appoint one building coordinator for each facility and train this person on the long-term program goal of PM. Have only this person receive hot and cold calls on Monday morning and rationalize them. That is to say, it is known that some are not actually mechanical but people issues. This person can learn to read the thermo-

stat and even be provided additional thermometers to share. Only calls that are clearly a mechanical issue are forwarded to the work control desk but combined into one request for the morning/facility. In this way, one trip is required and it has been initially vetted by our new, semi-first responder, the building coordinator.

- It is known that many customers are satisfied when they simply get a response of some kind to their complaint. However, on Monday mornings, our HVAC technicians

THE IDEA HERE IS TO MAKE
THE CUSTOMERS FEEL HEARD
WHILE NOT SPENDING VALUABLE
HVAC TECHNICIAN RESOURCES
GOING TO AND FROM THE
BUILDINGS ALL MORNING.


were running all over campus to make these H/C calls be “heard.” To save on that resource we could find an apprentice, or other less costly resource, to preemptively visit each densely populated facility each Monday morning. This person walks the facility, floor by floor, and communicates with the building coordinators as well as staff in areas that often have hot-and-cold complaints. The idea here is to make the customers feel heard while not spending valuable HVAC technician resources going to and from the buildings all morning. However, if there is a “real” mechanical issue, this preemptive first responder is trained to direct urgent requests to the work control center.

- Concurrently with the implementation of our trade labor conservation measures, are the redirection of that same labor to activities that move each trade shop closer to the goal of PM. During the initial quarter at least

one a hopefully more, PM activities are scheduled diligently and not missed. Great care must be used to rationalize the selection of these activities. While it is known that PM will extend the life of building systems, the emphasis early in this transition places more weight on reliability and prediction. Keeping with the HVAC example, we would consider the following critical thinking or redirected PM activities.

- Conduct analysis to discover those HVAC systems that are poor design, advanced gain, or heavy use such that planned maintenance will help to further redirect resources from “unplanned” to “planned.” Preventive inspections and basic predictive testing provide a high rate of return for most systems. Furthermore, research has shown that preventive maintenance executed within the initial two years of system increases long-term reliability and performance of a new installation.
- PM inspections are designed to find work. The frequency and design of inspections must be adjusted so that work is created valued much more than the cost of the actual inspections—at least 3 to 1. If this is not the case, the wrong systems are being inspected or they are being inspected too frequently. Redirect this resource.

IT WORKS

The critical analysis of redirecting trade labor resources into initially improved reliability of systems and eventually life-cycle extension is a process that works. It is based on the reality that no significant resources area available to begin a planned maintenance program but we must have one. Therefore, we have to aggressively scrutinize how current resources are spent, and find new and clever ways to save and redirect them. 

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

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Price Discovery in Workplace Safety

By Michael A. Anthony, P.E., and Clint Lord

A University of Michigan research project will inform the next revision of an important safety standard. The result will benefit the entire education industry.

The International Safety Equipment Association's "ANSI Standard for Eyewash and Emergency Showers Z358" is among its suite of voluntary consensus standards undergoing a five-year revision of its requirements for installation, performance, operations, maintenance, and testing. APPA's Standards and Codes Council is engaged the development of the 2014 revision, because Z358 will affect total owning cost of classrooms, laboratories, hospitals, skilled trade shops, custodial closets, and other locations.

Estimates of the number of these installations in our industry are on the order of 1 to 10 million—some plumbed, some self-contained (See Figure 1.) They must be within 10 seconds travel distance, and provide water within 1 second that is between 60 to 100 degrees Fahrenheit for 15 minutes.

OSHA reports 2,000 eye injuries every day, but the data is not granular enough to discriminate among the causes. At the

University of Michigan, for example, there are 3,000 installations across 35 million square feet. In its 800-bed hospital system alone there are 580 eyewash stations. (Arizona State University's opinion on this requirement is described in the sidebar.)

The requirement for *weekly* testing of this technology has also revealed differences among stakeholders in our industry:

1. The degree to which stakeholders within our industry differ in approaches to workplace safety.
2. The fine line between suppliers of this technology meeting demand, and

creating demand through government regulation

NO SURPRISE HERE

The increase in the cost of maintaining our facilities, and the gathering pace of off-shoring research and development projects to nations where workplace safety assumptions are different, is not surprising.

Neither is it surprising that two industries—which together make up 24 percent of the U.S. Gross Domestic Product—should have stakeholders that disagree. However, few of the advocacy achievements by APPA's Standards and Codes



FIGURE 1

An Opinion on ISEA Z358

As universities continue to grow in enrollment and specialized programs, the safety of students, employees, and faculty remains paramount. Many safety standards lack substantial supportive literature and research. One of these standards is ISEA Z358.1, Emergency Eyewash and Shower Equipment. The requirement for testing is every 7 days and is greater than what is needed. This requirement puts an undue burden on the resources of the universities and institutions complying with the requirement.

Arizona State University has more than doubled the amount of research it conducts on its campuses and is looking to expand even further in the near future. Most of the research facilities will have an emergency eyewash or shower installed in each the labs, making the total number of stations that need testing grow exponentially. Having the resources available to meet the testing requirements of ISEA Z358.1 will require the university to hire additional staff, utilize educational personnel, or contract the testing in order to maintain compliance.

There are many options that would help reduce the current strain on resources in the university environment while enabling the institutions that are currently falling short of the standard to come within compliance. Opportunities to reduce this strain on campus could include moving to monthly testing, testing at the beginning of each academic quarter, or requiring flushing after any loss of water service to the facility.

Clint Lord, Director of Facilities, Arizona State University

Council since 2002 came to a unanimous agreement. Evidence to that are:

1. The expansion of arc-fault circuit interrupters into dormitories.
2. The relaxation of the fire pump no-flow testing interval
3. The defeat of the ASHRAE 90.1 requirement for 50 percent of all power outlets to be connected to timers.

WHICH CAME FIRST?

The National Technology Transfer and Advancement Act of 1996 is the parent legislation for technical innovation and regulation in the U.S. A natural and legal byproduct of the law is that 501(c)(3) nonprofit organizations such as the International Safety Equipment Association (ISEA) can influence legislation in other ways. Use of lobbying is a legal and enduring feature of American legislative processes and free speech.

The occupational health and workplace safety services market in the U.S. is \$5.5 billion, and will grow at 4.7 percent going forward, which is three times the growth of the U.S. economy. Is this growth driven by increased hazards, or is the growth the result of assertive advocacy for more regulation?

The U.S. standards system welcomes competing interests and encourages them to work out their differences in an open and transparent process mediated by the American National Standards Institute. A similar process can be used to work through differences within our own industry.

THE FM AS CHIEF RISK OFFICER


The facilities manager must be sensitive to the safety professional's expertise, frequently hard-won from experience with tragic accidents. On the other hand, the safety professionals must present ideas to reconcile the competing requirements of economy and safety. This technology provides necessary relief to *one person*. Electrical generators, fire pumps, transfer switches, mass notification and fire alarm systems, however, affect *many more* people. Shouldn't the

facilities manager allocate grim resources to mitigating hazards most likely to occur and affect the most people?

All difficult questions involve matters of degree. We all differ by measures of our own tolerance for risk, and all our life choices are informed by that tolerance. But what about the risk to the balance sheet? That is one of the reasons the University of Michigan Plant Operations is funding a research project through its School of Public Health, which will gather new data that can be used during the Z358 revision.

As has been discussed in previous columns of Code Talkers, the influence of the public nonprofit "user-interest" in the American national standards process—one of the largest purchasers of infrastructure—is virtually non-existent. We do have data, however, that can enlighten innovation and regulation of this

important safety technology.

The Standards and Codes Council has taken special efforts to understand all dimensions of industry thinking about this technology. It hopes to deliver the same advocacy success in this standard as the advocacy achievement in the fire pump no-flow test. To do this; however, the education facilities industry needs to disrupt itself and move into new spaces. 

Mike Anthony is senior manager of national infrastructure strategy at the University of Michigan, Ann Arbor, MI, and regulatory advisor to APPA's Standards and Codes Council and can be reached at maanthon@umich.edu. Clint Lord is director of facilities management at Arizona State University, Tempe, AZ, and a member of APPA's Standards and Codes Council and can be reached at clint.lord@asu.edu. This is Lord's first article for *Facilities Manager*.



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FPI 2013: Approaching the Finish Line

By Maggie Kinnaman

When you read this article, there will be just a few short weeks left to complete your APPA Facilities Performance Indicators (FPI) survey for 2013, which closes on December 16, 2013. Remember that you can contact Christina Hills or me with any specific survey or data questions. Our contact information can be found at the end of this article.

IT'S GETTING BETTER ALL THE TIME

I'd like to call your attention to some enhancements that have been added to the survey this year:

- In **module 2** (thanks to Rolly Maelwas, facilities asset management coordinator with the Northern Alberta Institute of Technology located in Alberta, Canada), we're including a worksheet to determine the average adjusted age of your campus buildings. Rolly has incorporated a weighting factor that takes into consideration the GSF of buildings and also the impact of recapitalization on the average adjusted age of buildings.

I encourage you to take a look at this new addition.

- In **module 4a** of the custodial section, participants requested data on custodial supplies, so a new enhancement to capture this data has been added.
- Additionally in **module 4a**, within the energy/utilities section, questions have been added related to expenditures associated with operating a district utilities plant and also the associated FTEs.
- Finally, in **module 4a**, two "Other" sections have been added. The first is used to capture typical facilities related expenditures and FTE. Included are such services as trash removal, special events setups, moving and storage, and window washing. The second captures GSF, expenditures, and FTE for services that may be aligned under facilities management for administrative convenience, but are not true facilities management services. Services included could be public safety, telecommunications, mail services, and environmental health and safety.



- We've also added a new report to help participants identify missing data, or data that has been filled in with a zero. Many participants have requested such a report to help them identify what might be missing in their data set. They may look at the home page of the survey and see the % complete gauge at something less than 100 percent and wonder what they might have missed. This report provides a "reality check" prior submittal of the final survey data. Missing data should be your primary focus of this report, but data points with input of zero should also be checked. Some of that input may be totally valid, but other data points might have been marked zero in error.

I encourage you to request a data review from APPA as you complete each

module within the survey. This will generate a data check, giving you feedback regarding the overall integrity of your data. You will want to get this feedback sooner rather than later so that you're able to make corrections.

Even in instances where you have no data outliers or audits, you may in fact have data that is conflicting from module to module. An example of this could be in module 5 where there is an ever-increasing needs index but the investment rate is well over minimum for the past five years. In concept, investments over minimum tend to reduce your needs index.

SURVEY DEADLINE:
DECEMBER 16, 2013
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www.appa.org/research/fpi

HITTING THE FINAL SUBMIT BUTTON

Before final submission, I always recommend that submitters look at their live reports and use them to tell their story. If the data doesn't support the story that you've been telling on your campus, go back and review your data to determine whether you need to change your data, or change your story. Once the two are congruent, and you have no unresolved audit alerts or outliers, then hit that final submit button.

Use your time wisely when completing the FPI survey. Mid-December is right around the corner. Remember that once the survey closes, the data set is locked down and all subsequent changes to the data set can only be made by the data scrubber.

Give yourself adequate time to you reach the FPI finish line having conducted a thorough review of your entire data set. Data accuracy in your FPI survey then is transformed into a credible report that helps support the story that is yours to tell key campus decision makers.

After all, buildings and infrastructure are the largest capital asset on any campus, and it's your job as facilities manager to inform key decision makers the state of those assets. Help to ensure that your story is backed up by sound, credible FPI data. 

Maggie Kinnaman is an APPA Emeritus Member, APPA Fellow, and Past APPA President. She can be reached at maggiekinnaman@comcast.net.

You can also contact Christina Hills at christina@appa.org with any questions.



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APPA U Class of September 2013 Celebrates a Fantastic Week of Learning

By Suzanne Healy

APPA U, which was recently held in Fort Lauderdale, FL, showcased another successful professional development gathering of the Institute for Facilities Management and the Leadership Academy, welcoming colleagues from around the globe to learn, network, and collaborate.

We are grateful for the dedicated faculty who make these programs such a success. A special note of thanks goes to Institute Deans, **Mary Vosevich, Jay Klingel, Lynne Finn, and Don Guckert**; and our Academy Deans, **Chuck Farnsworth, David Judge, Ann Jenkins, Shawna Rowley, Matt Adams, Jim Jackson, and Doug Christensen**. APPA would also like to extend a special thank you to **Tony Todaro and his team** at NOVA Southeastern University for hosting our Wednesday tour that showcased their Center of Excellence for Coral Reef Ecosystems Research Facility—attendees that participated commented that it was AMAZING!

Throughout the week, students had the opportunity to inter-

act with experts who brought their knowledge and experiences from vast backgrounds, providing a rich environment for all attendees.

As the week drew to a close, we celebrated with graduation ceremonies for the Class of September 2013—welcoming 58 new alumni.

A big kudos to all those 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, departmental, and institutional goals.

If you have any questions, please contact Suzanne Healy at suzanne@appa.org or visit www.appa.org/training for more on all of APPA's program offerings. ☎

Suzanne Healy is APPA's director of professional development and can be reached at suzanne@appa.org.



PHOTO BY RHONDA HOLE

Academy Graduates

In alphabetical order; not all graduates are pictured.

Luis Abreu, *LIM College*

Beau Burgen, *Washtenaw Community College*

Dan Dayhoff, *Florida State University*

Daniel Durham, *University of North Carolina/Greensboro*

Robert Farlow, *University of Maryland/Baltimore*

Brian Flesner, *Doane College*

Lynn Fletcher, *University of Colorado/Boulder*

Tammy Gannon, *Culver Academies*

Jean Graziano, *University of Maryland/Baltimore*

Charles Hornburg, *Michigan State University*

Julie Im, *Middle Tennessee State University*

Scott Jennings, *North Carolina State University*

Roslyn Johnson, *University of Chicago*

Ron Lester, *Southern Nazarene University*

Russell Reese, *Pennsylvania State University*

Barbara Russell, *Georgia Tech Research Institute*

Greg Silkman, *University of Missouri/Kansas City*

Tom Sullivan, *University of Michigan/Ann Arbor*

Rohan Talwar, *Rose-Hulman Institute of Technology*

Susan Thews, *Culver Academies*

Institute Graduates

In alphabetical order; not all graduates are pictured.

Carole Acquesta, *Appalachian State University*

Mary Augustine, *DTZ a UGL Company at Tulane University*

Jaime Baro, *San Diego State University*

Bob Bauer, *University of Cincinnati*

James Bevington, *University of Virginia*

Bernie Beyer, *John Carroll University*

Ken Bloomer, *University of Cincinnati*

Charlie Brien, *University of North Texas*

Francis Brindisi, *FDA*

Edward Brown, *University of Maryland*

Vince Chavez, *University of New Mexico*

Paul Corcoran, *Minnesota State University/Mankato*

Randal Davis, *Missouri University of Science and Technology*

Chad Davisson, *Weber State University*

Chad Dragan, *San Diego State University*

Gordon Elvis, *FDA*

Jason Estensen, *U.S. Marine Corps/ Camp Pendleton*

Richard Flanagan, *Draper Laboratory*

Jon Gibb, *Dixie State University*

Erik Hall, *North Carolina State University*

Jerry Helton, *Virginia Commonwealth University*

Tom Hulett, *Metropolitan Community College*

Jeff Marcinkowski, *Grand Valley State University*

Larry Milby, *Illinois State University*

Mark Olmstead, *Kellogg Community College*

Dwight Raby, *Emory University*

Ray Robichaud, *Wilfrid Laurier University*

Jonathan Shambare, *University of Alaska/Fairbanks*

Steve Sicluna, *York University*

Bing Smith, *Pennsylvania State University*

Victor Smith, *North Carolina State University*

Matthew Sullivan, *Sullivan, Matthew*

David Tate, *Georgia Tech Research Institute*

Anthony Todaro, *Nova Southeastern University*

Sue Van Cleve, *University of New Mexico*

Christopher Vera, *Texas A&M University/Kingsville*

Tom Welburn, *Michigan State University*

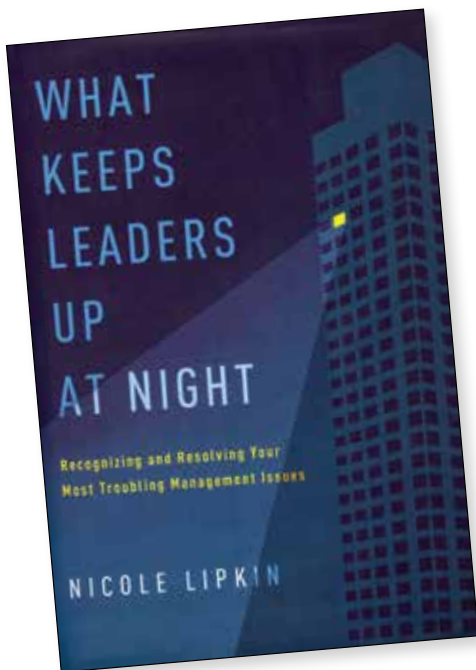
Mark Zimmerman, *Elizabethtown College*



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

Leadership takes many forms

and requires constant attention and effort. My hope is that the two books reviewed in this issue identify some things that have affected you as a leader, and provide you with some ideas for a New Year resolution. Happy reading!



WHAT KEEPS LEADERS UP AT NIGHT: RECOGNIZING AND RESOLVING YOUR MOST TROUBLING MANAGEMENT ISSUES

Nicole Lipkin, AMACOM, New York, 2013, 237 pages, \$21.95 hardcover.

For some, leadership comes easily. Others need to work at it. Maintaining leadership, forward momentum, and success requires special talents and management. That's what Nicole Lipkin discusses in *What Keeps Leaders Up at Night: Recognizing and Resolving Your Most Troubling Management Issues*.

Based on her personal experience (and failure) with leadership of her own consulting company, Lipkin uses her expertise in clinical psychology and business to present eight issues that result in leadership failures. Each issue is described with multiple examples that look at different facets of each issue. Many of the examples are timely and topical for facilities officers. Most of the examples come with a description of the psychology behind the situation, and the psychological background is not overly technical or theoretical.

MAINTAINING LEADERSHIP, FORWARD MOMENTUM, AND SUCCESS REQUIRES SPECIAL TALENTS AND MANAGEMENT.

The issues or situations presented dovetail well with many of APPA's Leadership Academy principles, the BOK, and presentations at APPA events, such as listening to others for ideas, being supportive but demanding, controlling one's temper, dealing with change, and working with others. While I prefer hands-on learning because it usually results in deep, long-lasting learning, using a book such as *What Keeps Leaders Up at Night* can be a good refresher for APPA U courses.

Regardless of your learning style, this book is a good reference that highlights leadership issues and potential solutions that will support some of the leadership challenges faced by APPA members.



THE FACILITIES COMMITTEE

Harvey H. Kaiser, AGB Press, Washington, DC, 2012, 42 pages, \$20 softcover (available from APPA's bookstore).

The governing board of a college or university is the highest authority at the institution, and responsible for the institution as defined by enabling legislation and administering the board's bylaws. The Association of Governing Boards of Universities and Colleges provides resources to assist boards and campus leadership through monographs such as *The Facilities Committee* by Harvey Kaiser. The board's facilities committee is important because except for a dozen or so campuses, the campus facilities portfolio exceeds the value of the endowment.


Senior facility officers must be aware of the board facilities committee and how to keep them aware, but not neces-

sarily involved, in the successful management of the campus physical plant. *The Facilities Committee*, in addition to providing the board audience with clear recommendations, is a useful document for facilities officers, by providing a clear understanding of what makes a successful relationship between the board and management.

The facilities portfolio—the buildings, utility distribution infrastructure, landscaping, and hardscapes—merit and typically receive the attention of the governing board through a separate committee. The challenge for the facility officer is to work and report to the board in such a way that the board focuses on its mission and strategy

and doesn't micromanage the facilities operation. I've worked for and consulted with many institutions and have seen a wide range for behaviors. Those facility operations that had difficult relationships in the facilities area were missing or ignoring some key recommendations found in *The Facilities Committee*.

APPA members are fortunate to have access to tools that help address the recommendations found in Kaiser's monograph. The FPI and associated publications provide a foundation to respond to the recommendations. While it is recognized that the senior facilities officer may be removed from changing the details of the board's bylaws,

the SFO has the ability to influence the board and campus executives. This can be done by responding with best practices identified in *The Facilities Committee*, which is why this monograph is a good reference for your facilities bookshelf. 

Ted Weidner is president of Facility Asset Consulting, Noblesville, IN, and can be reached at ted@weidnerfac.com.

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Compiled by Gerry Van Treeck



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3M introduces a new extension to its line of commercial cleaning products – the 3M Glass Cleaner and Protector. The 3M Glass Cleaner and Protector has been specially formulated to cut cleaning time and remove stubborn deposits more easily. 3M Glass Cleaner and Protector is the industry's first glass cleaner with Scotchgard Protection. With repeated use, a protective layer is built up, making it easier to remove the toughest marks – fingerprints, lipstick, and even permanent marker. Additionally, it reduces fogging on mirrors and other glass surfaces, leaving behind an incredibly crisp reflection. 3M Glass Cleaner and Protector Concentrate 17L is Green Seal GS-37 certified in the 3M 'Twist 'n Fill' format as a glass and multi-surface cleaner, and the ready-to-use formula has less than 0.1 percent VOC. For further information on 3M products visit www.3M.com.



SCA, the maker of the Tork® brand of away-from-home paper products in North America, now offers its most luxurious line of High-End Hand Towels.

Featuring an embossed leaf throughout, the hand towels are soft, strong, and smart. The High-End Hand Towels offer superior softness and comfort. The towels are strong – individual towels don't break apart and are more absorbent, drying hands faster and requiring fewer per use. In addition, they're smart – with one-at-a-time dispensing, renewable and recycled content so fewer towels needed per visit, they reduce overall paper usage and restroom clutter. For greater information on SCA please visit www.sca.com/us.



Waterless Co. offers No-Flush urinals, some of the least expensive systems available. Cylinder/traps cost about \$10 each—less

than a quarter of those made by some competitors. These high-performance urinals can be easily installed in new and existing facilities including schools and sports arenas. Easy to clean and maintain, they are odor free and can save as much as 40,000 gallons of water per year. For more information regarding the Waterless Co. visit www.waterless.com.





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BADGETEC Corporation unveils QR Codes on business meeting nametags. Displaying QR Codes on business meeting nametags makes networking easier and permits smart phones to transfer name and contact information. Modern nametags are smaller,

more attractive, and clothing-safe relative to badge holders with pins. The new easy-to-print sheets of nametags for laser and inkjet printers allows meeting staff to print all the attendees names in advance or one-at-a-time as the guest arrive. For further information on BADGETEC Corporation products visit www.badgeteonline.com.

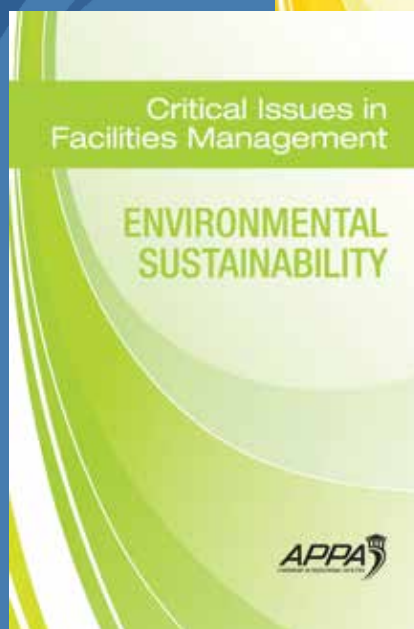


New Products listings are provided by the manufacturers and suppliers and selected by the editors for variety and innovation. For more information or to submit a New Products listing, e-mail Gerry Van Treeck at gvtgvt@earthlink.net.

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The Rising Cost of Higher Education

PART 2

Section III: Colleges in crisis – a summation

There are several ways to view the crisis that colleges and universities find themselves in at this juncture. Private colleges are racing to the bottom with discounts and an “arms race” of luxury spending because they cannot meet their revenue targets. They are in a spend-or-die situation. The latest Moody’s Report calls this situation “a failed business model” and notes that the number of domestic high school graduates peaked in 2007-08.

To illustrate:

- Bad business and cost model. Bill Bowen makes the analogy that our higher education model is like a string quartet. You can neither speed up how they play nor reduce the number in the quartet. Higher education cannot cling to a model and a culture that associates increasing scale with decreasing quality, especially in the Internet age, which is really all about scale.
- Declining domestic high school graduate populations are intensifying the competition for students in private colleges—colleges already challenged by diminishing demand owing from high tuition sticker prices. The response to decreasing demand here is: 1) Club Med-style “arms race” in spending, and 2) widespread discounting. Both strategies mortgage the future and when combined are deadly. Essentially we’re spending more and charging less, and we won’t change our cost model.
- State universities and community colleges are growing because they are getting a higher share of the (declining) college-bound student market. At the same time, higher education funding is one of the few discretionary parts of the state budgets and thus is vulnerable. Especially vulnerable as states begin to own up to the massive health and retirement mandates they face.

The student debt of \$1 trillion or more is a political crisis and a substantive one. States will continue to withdraw support from higher education while intensifying cries for accountability and cost control. Higher education has only two choices: reducing costs

or raising prices. Public higher education’s political capacity to raise prices will be limited, given its severe political consequences. Therefore, the inevitable conclusion is that the cost of operating colleges and universities must be brought down.

Colleges and universities, in the main, have dealt with financial challenges by assuming they are business cycle challenges. They address those with short-term palliatives such as across-the-board cuts, travel freezes, and salary freezes. These are designed to be “made up” when the good times return.

However, higher education is now facing structural economic change along with cyclical ups and downs. Some of the structural change relates to changing demand and the globalization of higher education (e.g., China, Saudi Arabia, others building universities worldwide); some relates to changing student preferences (shift in focus to getting a job more than a broad education); some has to do with the widespread acceptability of distance education and the emergence of new providers who are not saddled with campus costs or traditional cultures. Yet, much of it simply has to do with higher education reaching the limits of affordability. Potential students are now choosing other options.

However unpalatable, solutions reside in challenging the sacred cows, such as:

- Exposing and then managing the issue of “capacity” utilization—too much empty classroom space, laboratory space, the number of courses taught, etc.
- Exposing the realities of higher education’s capital programs—one-time money from donors and states to build buildings that are not always needed but nonetheless must be maintained even as operating funds decline.
- Demanding extensive analysis of the relationship of arms race spending on enrollments.
- Understanding the financial and political cost of attrition. At some institutions, this is starting to be managed more systematically. Much more can be done.

- Outsourcing in ways that *import* innovation.
- Using online technology tools and approaches to increase scale. Break the myth that small class size and quality are unalterably locked.

Higher education's failure to begin to question, revise, and alter the culture myths that hold us together is to sentence us to a death by a thousand cuts. We

cannot withstand an eternity of 2 percent salary increases, positions taken away when vacancies occur, program consolidation, continued deferred maintenance, and more. This simply invites innovators from the outside to do what we are unwilling to do ourselves. Hence the Innovator's Dilemma and the challenge of incumbency.

Section IV: Top issues in higher education facilities

How the critical issues were identified

The premise of the Thought Leaders symposium is that facilities leaders have much to contribute to the major challenges facing higher education. This year participants felt they could offer unique leadership on the matter of rising costs.

Nine top issues were identified by symposium participants, along with critical questions for institutional dialogue. The questions are the heart of the exercise: They are intended to guide facilities managers and university leaders in the discussions at their own institutions. A major goal of the Thought Leaders series is to help individual colleges and universities assess where they stand and help them develop strategies for the future.

1. Align the programs and priorities of the institution with its mission and vision.

The Issue: Today's colleges and universities cannot be all things to all people—they must focus on their own mission and vision.

Strategies:

- Analyze the institution's programs to see how well they reflect the mission and vision of the college or university.
- Eliminate degrees, programs, or activities that no longer serve a purpose for the institution.
- Focus on those efforts that enhance the college's or university's distinctiveness.

Thought Leaders participants saw many institutions squandering their energies on efforts that distracted from their main purpose. Nonessential programs or majors might have had significance at one time, but in the current financial climate, colleges and universities cannot afford to maintain departments that attract few students or administrative offices that serve outdated roles.

Start this process by taking a close look at the institution's mission and vision. Make sure the mission deals with the questions of who is being served, how they are being served, and the unique aspects of the way they are being served. Let the process guide the analysis of programs and their purpose. Consolidating or eliminating programs is a painful process. Colleges and universities need to demonstrate to those within the institution—as well as within the community, state, and academia as a whole—that the decision is appropriate. It is not simply a matter of making the simplest or easiest cuts; it is a broader effort to focus on the organization's mission and vision.

At the same time, campuses should consider the needs of their state or region. Is there demand that is not being met? Can the institution shift its attention to strengthening academic programs that will serve both students and the community?

Finally, the most successful colleges and universities will be those able to communicate their distinctiveness and build on their strengths. Each campus needs a clear identity that sets it apart and justifies its worth; if higher education becomes commoditized and one institution is just as attractive as another, colleges and universities will have difficulty defending their tuition receipts and state allocations.

Questions for institutional dialogue:

- How well has the college or university defined its mission and vision? Have these statements been tied to specific learning outcomes or priorities?
- How does the institution prioritize academic programs? Do priorities reflect institutional goals?
- Which programs no longer fit the institutional mission? Can you justify their consolidation or elimination? Will you be able to achieve buy-in for this decision?
- What makes your campus distinctive? Can you articulate how you stand out? How well is this distinctiveness communicated? What is diluting this distinctiveness?

- How well does the facilities plan reflect the mission and vision of the institution as well as its distinctive identity?

2. Build campus-wide understanding of the “arms race” between institutions on campus spending.

The Issue: Conduct a detailed examination of how competition and rankings are shaping institutional decision making to make informed choices for the future.

Strategies:

- Honestly consider the importance of rankings to your institution.
- Consider the “arms race” in terms of your college’s or university’s mission and vision and understand how the institution makes decisions about spending.
- Identify the drivers of change that stem from changes in student expectations (different living quarters, health and wellness, etc.).

Almost everyone in higher education deplores the “arms race” triggered by college ranking systems and competition for superstar faculty and administrators, but no one seems to have a clear idea on how to stop the cycle. Few institutions believe they can simply walk away from the current system.

Assuming the “arms race” is here to stay, therefore, colleges and universities should take an honest look at how the system is shaping spending on their campuses. With a clear-eyed view of the implications of the “arms race,” senior campus leaders can make more informed decisions on where to invest their time and money.

Colleges and universities should assess how important rankings are to the institution. How widely are rankings promoted in marketing materials to prospective students and parents? Do potential freshmen cite the rankings in their decision to apply? What would be the potential cost of a drop in rankings?

The quality of architecture makes a difference in student success, but the drive toward a quality environment is not merely competition to look better. For example, employer/industry expectations regarding

the skills of our graduates are pushing changes in science buildings. These buildings are costing more to deliver to the standards of the industry; this is not being driven by competition with our peer institutions.

Institutions also need to revisit their mission and vision and see how the “arms race” either supports or distracts from the institution’s goals. If there is a conflict between the two, what is the process and what are the criteria for prioritizing the expenditure of finite funds?

Questions for institutional dialogue:

- How important are rankings to your campus? How much do they drive enrollment? What would be the cost if rankings slipped? If rankings increased?
- How much money does the college or university spend to maintain its current position?
- Does spending to maintain rankings align with the institution’s mission and vision? If conflicts arise between investments driven by rankings and those driven by the mission, what is the process for prioritizing spending?

Data Point:

The higher education “arms race”

What do college ranking systems really care about—and why?

“Rankings are not benign. They enshrine very particular ideologies, and, at a time when American higher education is facing a crisis of accessibility and affordability, we have adopted a de-facto standard of college quality that is uninterested in both of those factors. And why? Because a group of magazine analysts in an office building in Washington, D.C., decided twenty years ago to value selectivity over efficacy, to use proxies that scarcely relate to what they’re meant to be proxies for, and to pretend that they can compare a large, diverse, low-cost land-grant university in rural Pennsylvania with a small, expensive, private Jewish university on two campuses in Manhattan.”

—Malcolm Gladwell, “The Order of Things: What College Rankings Really Tell Us,” *The New Yorker*, February 14, 2011.

3. Better utilize and manage space.

The Issue: Inefficient use of space squanders the institution's highest cost asset—its buildings and grounds.

Strategies:

- Make space management a priority at the highest levels of the institution.
- Clearly communicate space policies and goals to the entire campus community.
- Gather comprehensive data about space to support planning and decision making.
- Identify unproductive uses of space as well as the benefits of improving efficiency.

Colleges and universities have invested in their built environment for years—sometimes more than a century—and the campus stands as the physical embodiment of the institution itself. However, many campuses are underutilized and underproductive. Participants at the Thought Leaders symposium agreed that wiser decisions about space would make a real difference in the college or university budget.

Support at the highest leadership levels is critical to changing campus thinking on space. Senior facilities officers may need to educate campus leaders on the role of space and support them through the process of mastering the topic.

With space identified as a top priority, institutions can start to align their overall mission with their space policy and elucidate their space priorities. With space needs clearly outlined, the campus can better communicate its goals and enforce its policies. Space will always be a contentious issue, but achieving buy-in is easier if everyone understands the goals and how they reflect the values and mission of the institution.

Another important step is understanding what space you have and how it is used. Solid, reliable, in-depth metrics about space are critical. Institutions with robust space management systems track a wide number of variables and regularly perform visual audits to assess not only the size of classrooms and labs but also their quality.

Finally, institutions need to look at where space is being underutilized. Increasing the productivity of space

makes better use of the campus's investment, but it can also have other benefits. Scheduling classes year-round not only makes better use of facilities, it also helps students decrease their time to graduation.

Questions for institutional dialogue:

- Do the board, the president, and the chancellor see space utilization and management as a priority? How can senior facilities officers support them in understanding space issues?
- Does the institutional mission define the space policy? Or are the two in conflict? What would it take to align the space policies with institutional goals and vision?
- Is the space policy clearly defined? How well is it communicated? How can you improve support of your policies and goals?
- What kind of data is in place on space? What additional data do you need? Can you put into place a new system for gathering comprehensive space data, including assessments of quality?
- How do you measure the cost of space? Is cost data detailed enough for informed decision making?
- Can you identify space that is being underutilized? What sort of incentives could the institution offer to students, faculty, and departments to improve space utilization? What would be the ancillary benefits to better space management?

Data Point:

Space management and productivity

Classroom allocation as a cost issue

"Extensive data show that better allocation of academic space—i.e., which courses are scheduled in which classrooms at which times—is an overlooked yet vital cost issue. Better allocation of classroom resources—identifying and addressing primetime bottlenecks by focusing on room ownership, meeting pattern efficiency and last-minute cancellation, etc.—can postpone or even cancel entire expensive classroom construction projects."

—Gene Hickok and Tom Shaver, "Higher Education Can't Wait," *Inside Higher Ed*, April 26, 2013.

4. Involve faculty in decisions about facilities and space.

The Issue: Colleges and universities need the input and support of faculty for space management programs to be successful.

Strategies:

- Understand the current culture of space at your institution.
- Develop concrete steps for shifting the culture and achieving buy-in from faculty.
- Ensure faculty can contribute and are heard.

Improving space management has to start at the top, but it must have the support of a wide base of faculty and staff if it is to succeed. Human beings are territorial about space; it is understandable that departments and professors cling to their offices and labs. The culture of space on most campuses has encouraged this kind of thinking. It is time, however, to change that culture and create a new philosophy of space. This is a challenge that will only be met with the engagement of faculty.

The most successful space and facilities programs are those in which all sides respect the input of one another. Faculty can contribute information about their needs; administrators can offer guidance on campus-wide goals and priorities; and space management staff can detail budgets, schedules, utilization, and efficiency. If the ground rules are clear and everyone is listening, the institution will have made major strides in addressing its space challenges.

Questions for institutional dialogue:

- How are faculty currently involved in the allocation of space? Is their role too limited or too large? What would need to change to achieve a balanced approach?
- Is there a process for seeking input from different units of the institution regarding space?
- What is the level of buy-in of space management policies from faculty? What steps need to be taken for all sides to reach an understanding and move toward agreement?

Data Point: Changing the culture of space

Steps to an effective approach

Phil Rouble, facilities planning specialist at Algonquin College, suggests the following steps to change the culture of space on campus:

- Ensure you have a transparent and up-to-date space inventory.
- Establish a space management committee, led by academic affairs but with cross-campus representation.
- Empower the space management committee to set clear targets for levels of space utilization.
- Assemble the deans or department heads periodically to review “utilization zone analysis”—a close look at how well individual spaces are achieving utilization targets.

—Daniel Fusch, “*Changing the Culture of Space Allocation*,” Higher Ed Impact, *Academic Impressions*, December 8, 2011.

5. Identify programs and facilities that need investment.

The Issue: The cost of neglected buildings, programs, and systems can quickly escalate. Institutions should seek out areas where investment is not being made, understand what is happening and why, and seek to reprioritize when investment is needed.

Strategies:

- Identify those buildings and systems that need new investment to remain useful to the institution.
- Use industry standards to gather data on the functionality and condition of buildings and determine the cost of renewal.
- Understand the cost of failing to invest in neglected buildings.

Recent financial pressures at colleges and universities have exacerbated a long-standing problem—that of neglected buildings, programs, and systems. The list of facilities that require significant upgrading and reinvestment is long and ever-growing, but administrative departments, academic programs,

and IT systems can also suffer from neglect. Allowing the campus to decay is a poor use of resources, so colleges and universities need to take steps to understand areas where attention is critical.

The first step is to identify at-risk structures or systems, but equally important is to quantify the cost of further neglect. The college or university needs to be clear on the cost of failing to make necessary investments. Will a building need to be demolished? Replaced? What will be the cost of relocating users?

Solid data is critical to this process. Institutions need to understand the condition of their facilities and how they are used. Industry groups have created tools to aid in this process, including the Facility Condition Index (FCI), developed in cooperation with APPA. The FCI is the ratio of deferred maintenance dollars to replacement dollars; it provides a straightforward comparison of an organization's key assets. Another key metric is the functional adequacy of the space—how well does the building fulfill its purpose? Conduct a gap analysis to determine what changes to make to increase a facility's functionality. The more hard data these analyses can produce, the better, since they will give institutions the information to objectively prioritize investments.

Data Point: **Facilities reinvestment**

Taking a strategic, data-driven approach

"It is important to take a strategic approach, looking at the entire campus holistically. Any analysis, in order for it to be valid, must be based on accurate, objective data, including an understanding of current facility condition and remediation costs, functional adequacy, and demographics. Without access to detailed information regarding these issues, facilities managers and capital planners find it virtually impossible to decide whether buildings are worth the investment required to make them both useful and usable."

—Ray Dufresne, "Understanding Functional Adequacy and Facility Condition for Strategic Decision Making," Facilities Manager, November/December 2012.

Questions for institutional dialogue:

- What data is available about the functionality and condition of buildings? What would it take to get the institution the data it needs to make good decisions?
- What is the cost of continued neglect?
- Is there an objective system in place to prioritize investments? Can the institution defend its choices?
- Who are the champions, stakeholders, and decision makers for various at-risk buildings, programs, and systems?
- How do you evaluate your results?

6. Manage rising labor costs.

The Issue: Higher education facilities are confronting a loss of skilled labor and rising costs to hire skilled staff.

Strategies:

- Keep informed about the skilled labor market in your region to be prepared for upcoming changes.
- Evaluate the competitiveness of your institution and look for ways to increase your desirability to employees.

The facilities management industry as a whole and higher education in particular are confronting a looming shortage of skilled workers. The number of young people entering training or apprenticeship programs for skilled trades has declined dramatically. Meanwhile, those working in the trades today are reaching retirement age. More than 40 percent of construction workers, for example, are baby boomers, according to *Occupational Health & Safety Magazine*. As those staff move out of the workforce, not enough skilled trades people will be available to fill the gap.

As the market grows more competitive, higher education stands at a disadvantage. The financial strain on most campuses has reduced compensation, health care benefits, tuition assistance, and long-term job security. Where once colleges or universities were preferred workplaces, now they cannot compete against the private sector.

Institutional knowledge is also at risk. Older employees have often worked in the same position for years; they have grown to understand the quirks of existing buildings. As those staff members retire, they

will take with them decades of knowledge that facilities departments would be wise to try to capture. New employees will have a hard time picking up where their elders left off—many workers keep jobs for shorter periods today. An employee on the job for a year may only have begun to know the particulars of campus buildings and infrastructure.

Participants at the Thought Leaders symposium encouraged greater awareness about shifts in the labor market and more flexible HR policies to attract younger workers. Employees in highly competitive trades will soon be able to pick and choose where they work. More flexibility in policies, salaries, and advancement opportunities will help the institution attract critical staff. This flexibility can be difficult to achieve—public institutions must work under state hiring rules, while unionized campuses must deal with collective bargaining. Institutions need to have a clear sense of the roadblocks to flexibility and the stakeholders involved.

Questions for institutional dialogue:

- Is your campus experiencing a shortage of skilled labor? What are projections for the labor market in your region? Are there formal mechanisms in place to track this? Do you expect shortages and, if so, in what time frame?
- What are the ages of your workers? When would you expect certain staff to retire? Do you have a mechanism in place to capture their institutional knowledge?
- What factors determine labor costs on your campus?
- How can you reach out to industry, trade schools, and community colleges to get the skilled workers you need?
- How widespread is awareness of labor issues on your campus?
- How flexible are your HR policies? Do candidates see your institution as a desirable employer? What would need to change in your policies to improve your desirability?
- What barriers stand in the way of increasing flexibility? Who are the stakeholders involved? Are others within the institution willing to discuss ways of removing these barriers? If not, why?

Data Point: Skilled-labor shortage

The declining competitiveness of higher education

“When I went to work for the university, I came out of industry. The people who recruited me said, ‘We can’t pay you what you are making now, but look at the benefits and look at the retirement and all these things that go with it.’ That was a selling point—it has been for years—but those benefits are under attack. It makes it even more difficult to recruit and retain.”

—Brooks Baker, associate vice president for facilities, University of Alabama at Birmingham, quoted in “Facilities Managers Discuss Major Challenge: An Aging Workforce,” *Chronicle of Higher Education*, July 17, 2012.

7. Understand the challenges posed by increasingly complex buildings.

The Issue: New building systems offer enormous benefits to institutions but also come with new costs and operational problems.

Strategies:

- Understand both the benefits and costs of complex building systems.
- Work with vendors to try to simplify building management systems.
- Keep up with training for employees as building management systems evolve.

New management systems give facilities managers a tremendous amount of control over buildings. Building management systems allow fine-tuning of electrical consumption, air flow, lighting, security, and advanced sustainability systems. These systems have astounding potential, but they are also difficult to operate and time consuming to master. Today’s high-performance buildings must be as fine-tuned as race cars; fail to adjust systems correctly, and costs can suddenly skyrocket.

Managing these systems is a growing challenge for higher education facilities departments. Maintenance jobs that could once be performed by low-skilled

employees must now be handled by highly skilled, highly trained experts—experts who must stay abreast of new developments in the field yet remain familiar with legacy systems on campus. And while advanced systems are intended to cut costs by reducing energy consumption and streamlining processes, they often increase costs.

Participants in the Thought Leaders symposium urged senior facilities officers and associations such as APPA to take a stand against growing complexity and work with vendors to simplify systems. Others within the facilities industry are also calling for simplified and easier-to-manage systems. A 2002 article on the website GreenBiz.com, for example, urged manufacturers and vendors to develop next-generation building management systems that would consolidate data from different building systems, accommodate third-party analytic software, integrate a wide range of systems (including facility management systems, business systems, and smart grids), and present information in clear, intuitive dashboards. These sorts of systems can help make building management easier and less costly for campuses.

Questions for institutional dialogue:

- What are the complexities of building management systems on your campus? Are the benefits worth the costs?
- How can the facilities management industry work with vendors to reduce the complexity of systems and keep costs down?
- How can senior facilities officers use the information from building management systems most effectively?
- What sorts of training and education programs are necessary to keep staff current on building management systems?

8. Limit rising costs associated with complying with codes and regulations.

The Issue: Federal, state, and local codes have grown increasingly complicated and place a burden on higher education.

Strategies:

- Understand the cost of codes to your institution.
- Educate senior administrative leaders on the burden of codes, and present ways to influence the process.
- Join forces with APPA to influence the development of codes and standards.

Addressing building codes is a standard part of facilities construction and management. Codes have an important purpose in ensuring the health and safety of the public, but participants at the Thought Leaders symposium believe many codes have gone beyond this straightforward goal.

New codes, often developed with the input of manufacturer, labor, and insurance industry groups, raise operations and maintenance costs to an extent disproportionate to their value. In other words, the codes are making buildings more expensive without necessarily making them any safer.

Symposium participants believe the root of the problem is lack of involvement of higher education facility leaders in the code and standards development process. By coordinating with other industry groups and standards development organizations, education can make a case for its unique challenges and needs. For example, colleges and universities, unlike many other institutions, operate multi-building campuses with professional facilities staff onsite 24/7. Codes designed for single buildings without onsite staff can increase the burden on colleges and universities, which should be able to take advantage of the economies of scale that campuses provide.

APPA has taken several steps to enable the education sector to influence the development of codes and standards at both the national and international level, and has been successful in leading efforts to change standards, through the efforts of the APPA Standards and Codes Council. The mission of the Council is as follows:

- **To promote codes and standards awareness and education among member institutions.** The Council seeks to make APPA members aware through a variety of means of the codes and standards that impact the institutional mission.

- **Determine the impact of existing and proposed standards and codes on educational institutions.** The Council regularly evaluates emerging and existing standards and codes produced by national and international standards bodies, as well as government and regulatory agencies, in order to assess their relevance and support to the educational facilities environment, as well as evaluating the resource and financial impacts of compliance.
- **Influence standards and code development process and outcomes.** To accomplish this objective, the Council actively engages in the standards development and review process among government agencies, standards developing organizations, and others.
- **Set parameters on standards and codes on behalf of the education sector, and seek pragmatic solutions to the standards needs and requirements of educational institutions.** APPA's Standards and Codes Council seeks to ensure that the safety and well-being of students and the entire campus community remain first and foremost.

Thought Leaders participants urged senior facilities officers to get involved in efforts to shape code development through APPA and/or their institution. Facilities officers need to get a solid sense of what codes are costing their campus and then make the case for change to senior campus leaders. With the support of campus leadership, facilities leaders will be able to make progress reducing the cost of codes.

Questions for institutional dialogue:

- What standards and codes are impacting higher education costs?
- Who are the key decision makers at the institution who need to understand the challenge of onerous codes and can support the involvement of facilities officers with the issue?
- How can senior facilities officers shape and influence standards and codes?
- How can institutions pool their efforts or coordinate the investment of resources on standards and code development through the APPA Standards and Codes Council initiative?

9. Reduce the cost of unfunded mandates on the institution.

The Issue: The number of regulations and mandates on colleges and universities raises costs and places a burden on the institution.

Strategies:

- Examine the cost of regulations on your campus.
- Work with other institutions to lobby for less burdensome state and federal requirements.

Higher education is one of the most regulated industries in the United States. Administering financial aid, admitting foreign students, and conducting research all fall under complicated laws and regulations, many of which also have detailed reporting requirements. States also impose their own regulations, many of which, colleges and universities complain, overlap with federal requirements.

The result is a widespread sense that regulations are out of control. Particularly in today's higher education environment, where the pressure is on institutions to be productive and efficient, time and money spent filling out federal forms is burdensome.

In a recent survey of more than 2,000 higher education officials by the U.S. Department of Education's Advisory Committee on Student Financial Assistance, outrage boiled over. More than 85 percent of officials found regulations under the Higher Education Act burdensome; many specific regulations were cited that, respondents said, would yield significant cost savings if eliminated. Frustration at changing and evolving regulations is particularly high.

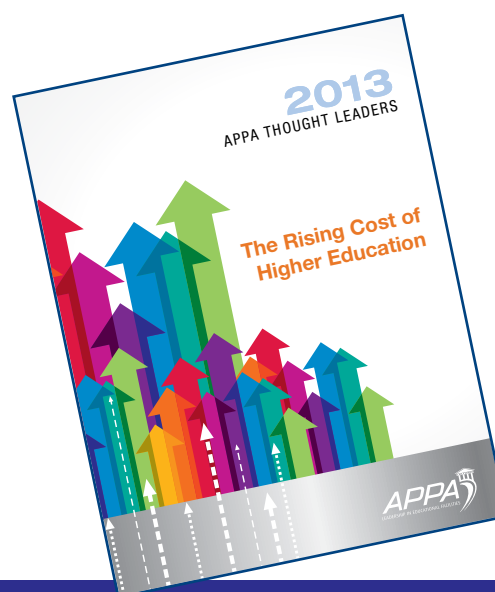
Participants at the Thought Leaders symposium agreed with the sentiments expressed in the survey and believe that reducing the regulatory burden will help institutions cut costs and improve efficiencies.

No one campus can change the regulatory environment. Reducing the burden of unfunded mandates will require the cooperation of the leaders of numerous institutions. However, individuals within higher education can start the conversation on their campuses by examining the role and cost of mandates. Reliable figures about the cost of individual regulations can give campus leaders evidence to lobby for

reductions in the regulatory burden on colleges and universities.

Questions for institutional dialogue:

- What unfunded mandates are increasing the cost of higher education?
- What are the costs of individual mandates? Is the benefit worth the cost?
- How can your campus partner with others in higher education to encourage the elimination or reduction of regulatory requirements?



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