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In Memoriam: Harvey H. Kaiser

Longtime APPA member, friend, and colleague Harvey Kaiser died in early October after a short illness. After spending 23 years as the senior facilities officer at Syracuse University, Kaiser embarked on a long career as a consultant and advisor, providing architectural guidance and strategic planning to campuses worldwide.

Harvey's work was monumental as he defined, explained, and provided solutions to the issue of campus deferred maintenance. His first major work, the 1979 monograph *Mortgaging the Future: The Cost of Deferring Maintenance*, began a long publishing career with APPA, SCUP, NACUBO, AGB, and other education associations and publishers. His most popular titles were *Facilities Audit Workbook* (later revised as *The Facilities Audit*), *Crumbling Academe, A Foundation to Uphold, Strategic Campus Development, and The Facilities Committee.*

Harvey taught for years at APPA's Institute for Facilities Management, and he wrote several chapters in the BOK (Body of Knowledge). In addition to his work for educational facilities, he was enamored with the architecture of U.S. national parks, and he wrote and photographed several guidebooks for the National Park Service, including the beautiful *Great Camps of the Adirondacks* and *Landmarks in the Landscape.*

I was honored to work with Harvey on many books, articles, and research reports over the years. He was a true gentleman who also was a demanding, particular writer who worked painstakingly over every word, sentence, and paragraph. When Harvey, Lander Medlin, and I were working on the *Foundation to Uphold* capital needs study in the mid-1990s, he was visibly pained when he had to submit chapter drafts for review by our research colleagues at Sallie Mae. "Steve, it's like letting them see how the sausage is made," he told me, but he was redeemed by the knowledge that most of his writing was retained with only minor alterations.

Harvey Kaiser's contributions to higher education, architecture, National Parks appreciation, facilities management, and more will be remembered and have an impact for decades to come. It was a pleasure knowing and working with him. 🔚

APPA'S FPI SURVEY DEADLINE: JANUARY 17, 2020

The deadline for submitting this year's FPI (Facilities Performance Indicators) survey data is January 17, 2020. You can access the survey at *https://www.appaorg/fpi-survey-access/.*

For additional information or assistance, please contact APPA staff member Christina Hills at *christina@appa.org.*

FPI 2.0
Facilities Performance Indicators

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▮ Getting to Workforce Excellence

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Enhancing campus security
with network solutions.

As urban development began to surround its once suburban campus, Mount Royal University (MRU) realized it needed to overhaul its security to better protect students, faculty and staff. To do so, it replaced its old, proprietary system with a comprehensive network security solution. This included Axis network cameras, horn speakers and door stations, as well as a proven video management system that could help manage all of these systems from a single intuitive interface.

Enhancing school security often takes more than simply replacing a few locks or adding some cameras.

Learn how MRU addressed the security challenges of its growing campus with network solutions: www.axis-communications.com/cap/mountroyal

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By Anita Dosik

Thought Leaders Series 2019: *Innovation in an Age of Disruption*

The 2019 Thought Leaders report, *Innovation in an Age of Disruption*, addresses the fact that few higher education institutions are truly embracing innovation in the face of adaptive challenges. How do you think outside the box? In other words, how do you approach thinking differently about the world around you and your institutional and organizational challenges? More importantly, how do you go beyond just thinking differently to actually seeing things differently? Contents include:

- Key takeaways about innovation and entrepreneurship
- Common approaches to higher education challenges
- Using innovation and entrepreneurship to tackle adaptive challenges
- Applying an innovative and entrepreneurial mindset to higher education's adaptive challenges
- Applying those mindsets to HE facilities' adaptive challenges
- Questions for campus discussion

APPA developed the Thought Leaders Series to conduct dedicated discussions on the future of higher education and the impact of that future on educational facilities. The annual Thought Leaders symposium convenes representatives of colleges and universities from across the United States and Canada alongside association leaders, industry consultants, and education experts. All Thought Leaders reports are free, thanks to the generosity of our sponsors, Jacobs and Johnson Controls, and may be downloaded from the APPA Bookstore or *https://www.appa. org/thought-leaders-series/*.

Become an APPA Officer: Nominations for 2020 Now Open

Strong and steady volunteer leadership is one of the core forces making APPA the association of choice for educational facilities professionals. Consider becoming a candidate for an elected APPA office. Elected officers gain valuable leadership skills and a chance to develop professionally in many meaningful ways, and being an officer provides a major opportunity to give back to the entire profession. There are five elected officer leadership positions, only three of which will be on the 2020 ballot:

- President-Elect
- Vice President for Member and Community Engagement
- Vice President for Professional Affairs

Consider nominating yourself—or others—for the position that best matches your passion and areas of expertise. To learn more, visit the APPA website. All applications and nominations for APPA office are due no later than **December 9, 2019.**

APPA Introduces "Pathway to Professionalism" Onsite Training Program

In response to a constantly evolving educational facilities profession, APPA has launched a new program called "Pathway to Professionalism" (P2P) to help educational facilities organizations and their institutions keep pace with the accelerating rate of change, while providing continuous learning opportunities for their staffs and schools.

P2P is a 90-day program using APPA's Customized Interactive Learning (CIL) platform and four onsite presentations on the core areas of the Body of Knowledge from APPA facilitators. Following the 90-day training course, qualified participants may elect to take APPA's Certified Educational Facilities Professional (CEFP) certification exam at no additional cost.

To learn more about how P2P can help you provide relevant, cost-effective training, please visit us at *www.appa.org/p2p.*

APPA's Next Institute and Academy — February 2020 in San Diego

Institute: February 2-6, 2020
Leadership Academy: February 4-6, 2020
Sheraton San Diego Hotel & Marina
San Diego, CA

By offering both APPA's highly regarded **Institute for Facilities Management** and **Leadership Academy**, APPA delivers quality professional training in an environment that encourages professional networking and collaboration with other education facilities professionals—in one location. This approach allows for less travel, easier registration, greater sharing of information, and an excellent opportunity for Institute and Academy attendees to network with each other throughout the week. Both the Institute and Academy are four-track programs held twice every year.

See you in San Diego!

Introducing APPA's Online Community Platform

Since APPA's founding in 1914, educational facilities professionals have expressed the need and desire to connect with colleagues and share best practices, seek assistance on complex facilities issues, discuss new technology applications, and more, as they support the mission of their respective educational institutions and organizations. As a result of APPA's new strategic plan, *Preparing for Every Future*, APPA is pleased to introduce the new Online Community Engagement platform to facilitate continued outreach, connection, and networking.

Given the high cost of travel and time away from the office, APPA's various communities seek to broaden your resource base virtually by making it easier to interact with and respond to the needs of facilities professionals. Features of the new Online Community include:

- APPA members only
- Searchable discussions, resources, and knowledge center
- Groups formed around your region, chapter, and special interests and topics
- Connect with other members based on skills, education, interests, and proficiencies
- Easy to update your APPA profile by simply logging into your myAPPA account
- Mobile and tablet responsive
- Replacing the APPAinfo listserv

To access and view two helpful instructional videos, log into your myAPPA account and select APPA Community from the menu (you can also access them via APPA's YouTube Channel.). You can update your APPA profile, join as many interest groups as you wish, post a question to a group, or continue a discussion on a topic of interest.

SAVE THE DATE!

APPA 2020 Annual Conference and Exposition

Boston, Massachusetts
August 1-3, 2020

Mark your calendar to attend next year's meeting and exposition to be held in Boston! You won't want to miss this exciting gathering of fellow facilities professionals and exceptional speakers.

Sound: Boosting Student Focus through Interior Finishes in the Built Environment

By Sandra Soraci, EDAC, LEED AP, NCIDQ

According to a recent study, the average college student will skip 240 classes throughout their four-year undergraduate education. Class schedules are increasingly competing with other opportunities—academic, social, and personal. Previously bound to a strict 8 a.m. to 3 p.m. agenda, college classes now present students with an entirely flexible schedule that can be decided upon daily.

This challenges universities to answer a question: How do we get students to attend class and keep coming back? While possible answers are as diverse as the student body, one thing is true—providing a positive environment for students that fosters engagement and increases student comfort has a strong impact on student performance and attendance. Universities have the opportunity to craft a built environment that encourages safety, health, and alertness through the consideration of educational design elements.

Through evidence-based design (EBD),

educational facility managers consider the impact of built-environment elements. Through research, decision makers often determine which products have the highest promise for student success and wellness, by taking into account the foundations of a healthy building: ventilation, air quality, thermal health, moisture, dust and pests, safety and security, water quality, lighting and view, and noise.

The 9 Foundations of a Healthy Building report, published by the Harvard T.H. Chan School of Public Health, outlines clear, actionable steps for achieving inclusion of these foundations, and the specific health and wellness benefits of including each element. When designers consider these foundations with occupants in mind, student performance improves and the ability to learn increases, fostering a desire to participate in the learning process. Specifically, identifying ways to dampen or remove unwanted noise from the learning environment improves the classroom experience for students and faculty alike.

THE IMPACT OF DISCOMFORT

When considering the nine foundations, the physical conditions—thermal health, dust and pests, and noise—offer significant room for improvement in terms of student comfort. For example, when a classroom is too cold, students are not able to focus on the lesson, as they are distracted by their discomfort and the inability to address their physical woes. This discomfort in the built environment also materializes in poor faculty retention and class attendance as well.

Discomfort can also be expressed in the form of an individual's inability to hear, negatively impacting the educational space's occupants in terms of learning function and capabilities. With EBD practices in mind, facility managers can reduce unwanted sound and improve students' classroom experience, ultimately motivating students to be in the classroom more frequently.

SOUND MATTERS

On college campuses, student spaces, faculty spaces, and those in between differ greatly in their design and purpose, but all must take acoustics into consideration. For example, large lecture halls seat hundreds of students for multiple hours each week. Because of this, the influx of unwanted noise is worsened as the room's occupants whisper, type on laptops, and shuffle papers. In a setting that already makes it difficult to interact with the professor and their peers, students are further burdened by difficulty in hearing the content being discussed, making attendance seem unnecessary and altogether frustrating.

Beyond the typical classroom and lecture hall settings, student wellness can be ensured through the consideration of acoustical performance in communal areas, including auditoriums. On college campuses, students are provided with opportunities to attend performances, speeches, demonstrations, panels, and other events in large auditoriums or theaters. Students expect an environment that supports the acoustic needs associated with attending such events. If the acoustics fail to meet the space's needs, students may be hesitant to return for future events due to the suboptimal experience.

According to Julian Treasure's consultancy The Sound Agency, which advises businesses worldwide about how to design with sound, when the impact of unwanted sound is reduced, distractions are lessened, speech intelligibility is improved, and cognitive discomfort is diminished. Providing positive spaces for students increases their desire to participate in the classroom and university spaces,

since they know their needs and expectations will be met. Facility managers must design their institution's spaces with EBD in mind, especially as it relates to acoustics in the built environment.

MATERIAL CHOICE CAN MAKE THE DIFFERENCE

Through flooring product selection, facility managers can minimize the impact of noise, because the right flooring will absorb sound and provide increased acoustic comfort. According to a recent report related to workplace acoustics, 54 percent of employees working in an office with wood, ceramic tile, or concrete flooring complained about noise in their office. Meanwhile, another study found that 4-mm rubber flooring is four times quieter than vinyl composition tile (VCT) and delivers at least twice as much impact-noise reduction than other resilient flooring types. This discrepancy demonstrates that proper flooring selection can greatly impact the comfort of occupants.

This principle applies beyond acoustics as well, as flooring selection can also influence air quality. VCT products require stripping, coating, and refinishing with chemicals that can produce volatile organic compounds (VOCs). According to a recent study, the same amount of VOCs are emitted during a single waxing as are emitted throughout a rubber flooring product's entire lifetime. With its never-wax protocol, rubber flooring eliminates the need for harsh cleaning chemicals, reducing the number of VOCs released while improving health and wellness and overall indoor air quality.

Providing a soundscape that supports student and faculty wellness and productivity is crucial in encouraging attendance and enthusiasm in university facilities. Careful attention to the nine foundations of a healthy building in relation to EBD, coupled with consideration of products available, such as luxury vinyl tile (LVT), carpet tile, and rubber flooring, is crucial in securing positive spaces for success. By understanding the needs of the space, facility managers promote growth and success for all occupants, facilitating the advancement of education and learning while ensuring the foundations of a healthy building and offsetting overall carbon footprint.

Sandra Soraci is a marketing leader at Nora Systems, Inc. in Salem, NH. She can be reached at *sandra.soraci@nora.com.* This is her first article for *Facilities Manager.*

An APPA Journey—Start Yours Today

By Kevin Austin

My APPA journey started about 30 years ago and has supported me with the professional development and contacts that have shaped my career. My first entry-level position in facilities management was on a small liberal arts campus. I reported to a physical plant director who was not particularly invested in APPA. Because the facilities department was small, contributions were not limited to those with a job title but were available to willing volunteers. As a result, I volunteered often and gained more experience and greater opportunities. I met a small group of local vendors who offered expertise and information. They assisted me in developing programs for onsite training and introduced me to new products and services. Unfortunately, because there was no APPA involvement, our small department missed the valuable opportunity to share its knowledge and experience outside the four walls of the institution.

After four years, I moved on to a larger public institution where I reported to a director of physical plant who introduced me to APPA. My supervisor enrolled me in the Institute for Facilities Management and placed me on the host committee for the Pacific Coast APPA (PCAPPA) Annual Conference in the early '90s. While my first job gave me the opportunity to volunteer for tasks outside my normal role, this job provided me with the path to grow professionally through APPA.

This involvement introduced me to many of the leaders of APPA on the West Coast. Those connections directly influenced the next 30 years of my career; they also expanded my network to vendor partners and consultants who helped me to gain a deeper appreciation of the value of my business contacts. They shared innovative ideas and products and also supplied me with an expanded group of experts whom I could rely on for advice, goods, and services. It was the experience I acquired in collaborating with them that now influences how I work to engage my team and many of our young leaders in APPA.

EXPAND YOUR KNOWLEDGE AND INFLUENCE

Whether you joined APPA several decades ago or last year, your membership offers you a unique opportunity to expand your knowledge and influ-

ence beyond your campus. APPA membership furnishes resources and training opportunities for career development. The APPA Institute for Facilities Management includes a broad range of offerings and covers four core areas:

- General Administration & Management
- Maintenance & Operations
- Energy & Utilities
- Planning, Design & Construction

At the University of Chicago, our team has been very active in hosting the Leadership Academy on campus. This series improves staff leadership skills and gives facilities leaders the tools to be successful and move ahead in their careers. The least expensive way to engage in professional development through APPA is with the monthly online webinars, which offer a wide variety of topics and continuing education credits.

Once you have some of these skills, the Pathway to Professionalism (P2P) is a great way to earn your Certified Educational Facilities Professional (CEFP) designation. Our team has put more than a dozen members through the CEFP program using a team approach. We found success in placing a group in a cohort, where they could support each other through the process. They went into the process as colleagues and came out as a team because of their shared experience. We were able to secure regional scholarships to fund much of the effort, which controlled the cost and saved our institution a significant amount of money.

CAREER GROWTH THROUGH TRAINING AND NETWORKING

Training is an important component of APPA, and professional networking with peers and resource partners is the perfect complement for career growth. The APPA Annual Conference is an excellent opportunity for training while developing connections and important relationships with peers and vendor resources from around the country. If you cannot travel to an annual conference, the APPA regional conferences are generally closer to home and offer similar opportunities for engagement. State and local chapters are growing across the country, and provide a closer option for everyone on

your team to engage in the APPA experience. Lastly, you can engage from your desktop with the APPA Online Community Platform to share resources, ask and answer questions, and meet peers with similar issues, concerns, and interests.

If you want to develop your leadership skills further, engage as a board member at the state or regional chapter level, write and submit articles, or volunteer for a committee. Your membership in APPA is only as valuable as your willingness to engage and promote it to your organization as a resource. Associate membership is available to all staff of member institutions; it only takes a few minutes for your primary representative to add names online. The associate membership makes all of APPA's resources available to you. Your investment in APPA is the best commitment you can make toward developing yourself. Start investing today! 🔷

Kevin Austin is senior director of building services, trade shops and residential properties at the University of Chicago in Chicago, IL. He can be reached at *khaustin@uchicago.edu.* This is his first article for *Facilities Manager.*

Pedestrian-Friendly, Sustainable Campus Emerges at Phillips Exeter Academy

By Mark Leighton, P.E., CEFP, and Peter Reiss, AIA, LEED AP

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reserving the fabric and tradition of a great institution's campus while modernizing it to move forward into future generations is a "high-wire experience." For each us involved in planning, designing, and managing these campus-wide initiatives, every decision, however minor, carries a larger meaning and consequence.

Our journey on the high wire encompassed the master planning and implementation for a new South Campus district within the 673-acre Phillips Exeter Academy in Exeter, New Hampshire. Founded in 1781, Exeter is a coed, independent school for students in grades 9 through 12.

The central mission of Exeter's South Campus master plan and building program was to create a vibrant new campus neighborhood with a reimagined landscape, new buildings, and

a future-focused evaluation of the physical layout of the site and its three existing athletic and recreation buildings. Also in the plans for the South Campus was a new performing arts center, the David E. and Stacey L. Goel Center for Theater and Dance.

ENVISIONING AN ARTS, CULTURE, ATHLETICS, AND WELLNESS DESTINATION

Between the main campus and the Exeter River is the academy's South Campus parcel. For generations, it was a back-of-the-house site, home to the school's athletic buildings and fields and a set of service and maintenance buildings nestled into the wooded terrain. The immediate objective of the master plan was to transform the aging complex and its surrounding natural environment into a strategically different destination. Exeter's trustees envisioned a creative hub where current and future generations could enhance their classroom learning with activities in the arts, culture, athletics, wellness, and the outdoors. Among the goals of the South Campus planning process:

- Modernize/reimagine the South Campus athletic buildings and the surrounding landscape
- Create a natural relationship and symmetry between dissimilar facilities built independently during the previous five decades
- Enhance pedestrian safety by reimagining pedestrian and vehicle movement and establishing safer, pedestrian-friendly connections with the main campus
- Improve open-space utilization and explore new outdoor and landscape features
- Look for opportunities to include onsite power generation in keeping with Exeter's environmental mission statement

To accomplish these goals, Exeter facilities and operations teamed with architects, engineers, landscape designers, and sustainability consultants. Taking an integrated, collaborative approach, the shared goal was to transform the South Campus student experience for current and future generations.

Aerial view of Thompson Field House and the 1,500 solar panels. Pictured is a tour led by Peter Reiss with Academy students on climate action day.

Southeast view of Thompson Field House and south campus.

BALANCING CONTENDING DYNAMICS OF PEDESTRIAN AND VEHICLE MOVEMENT

Finding a new way forward began with a familiar dilemma. Because the new performance center would host outside audiences, additional parking was needed. Another concern was adding vehicular traffic to Gilman Street, the access road into the expanded South Campus district. Gilman Street serves as the southernmost extension of the access "spine" connecting the main campus to the athletic complex and South Campus. The spine's winding pathway crosses Court Street, a town-owned road that separates the two Exeter campuses.

A longstanding issue for Exeter, as with many campuses, was determining where to accommodate parking and how to separate parking areas and automobiles from pedestrian pathways. In the context of planning the new Exeter campus, there was a clear contradiction between the desire to establish a close connection to nature with a peaceful landscape that contributed to the health and well-being aspirations of students, faculty, and staff, and the reality of expanding surface parking.

None of the initial options were appealing. Finding new surface parking required carving into the natural landscape, removing trees, and shoehorning paved lots into the South Campus. At least 300 cars would be moving into the site, a potential permitting issue with the Town of Exeter. A new access road would need to be built to bring these cars to the lots. Separating pedestrians and automobiles would be problematic given the geography and layout.

OPPORTUNITY IN PLAIN SITE

During brainstorming sessions, the field house architects proposed a potential solution. Why not take advantage of the large footprint of the proposed new field house and shift all new parking, plus some existing parking, underground below the

field house? Making use of a significant grade change at the rear of the field house, the adapted design could create 170 below-ground parking spaces. Because the new field house location was further south than the Gilman Street access road, and because there is a public roadway behind the field house, auto traffic could be taken off that pathway altogether and the need for paved parking lots could be eliminated.

This solution was adopted, and it put both new facilities—the theater arts and the field house—on a parallel track for completion. The amended configuration of pedestrian and vehicular traffic means a safer, quieter, and more enjoyable environment for students. In addition, the ripple effect of new parking capacity creates options to decrease the daytime parking demand throughout the campus and on the town-owned streets around the school.

Today, there is a pedestrian-only main pathway providing safe access and a new continuous walking spine that connects the new campus district with the main campus and offers students an inviting route to the field house, adjacent athletic facilities, and sports fields. There is still a street crossing at Court Street where the two campus districts meet. Public access to the riverfront, an important tradition for town residents, has been preserved.

COMBINING OLD AND NEW

In determining the feasibility of keeping and restoring the aging athletic facilities, a key criterion for the team was the projected cost of operation and maintenance. While the front-end costs of a replacement building will always seem more expensive than renovating an existing facility, the true investment needs to be seen in terms of life-cycle cost projected over a 50- to 75-year basis.

On Exeter's South Campus, the building program ultimately included the new construction of two new buildings, the renovation and façade restoration of an existing historic

building, and the integration of an existing 50-year old gymnasium with one of the newly built, adjacent buildings. The three existing South Campus athletic facilities included in the master planning and implementation were:

- The 1918 Thompson Gymnasium and pool
- The 1931 Thompson Cage Field House
- The 1969 Love Gymnasium

The Thompson Gymnasium, with its classic limestone

exterior, distinctive arched-windows, and column patterned façade, was preserved. New double-glazed windows, a new roof, and exterior restorations helped return the iconic structure to its stately original presence. A new fitness center was built in its lower level, creating a lively destination for all Exeter students.

Also preserved and creatively integrated with its adjacent athletic buildings is the Love Gymnasium. A new entrance was created, replacing an obsolete ramp entrance. The Thompson Cage Field House was demolished and replaced with a larger, multipurpose building now called the William Boyce Thompson Field House. The wooden running surface from the original elevated 1931 running track in the Thompson Cage was reutilized as flooring in the new field house.

ACHIEVING SUSTAINABLE OBJECTIVES

A U.S. Department of Education Green Ribbon School, Exeter has increasingly utilized green building practices, including sustainable design and construction. Opened in 2018, the Goel Center for Theater and Dance, which is expected to earn a Leadership in Energy and Environmental Design (LEED) Gold certification, utilizes geothermal energy to heat and cool its 63,100 sq.-ft. center. The new 85,000 sq.-ft. William Boyce

Pictured to the left is former Gilman Street which was transformed to a pedestrian walkway pictured below.

Thompson Field House holds 1,500 solar panels on its 200 × 300-ft. rooftop, generating enough power to offset the majority of the building's electric load.

Also a LEED Gold certified facility, the field house is projected to save the academy $2 million over the system's lifetime. Inside, its sustainable design includes abundant daylighting, LED lighting, and natural ventilation instead of air conditioning. Most of the interior space is cooled by large, quiet-running ceiling fans.

BENEFICIAL INTEGRATED TEAMING IN PLANNING, DESIGN, AND BUILDING

Today, South Campus hosts thousands of visitors each year and benefits every member of the academy community. Students, teachers, and staff learn, play, and build community in new ways enabled by the district's new buildings, grounds, and amenities. Green spaces provide new venues for outdoor events and exhibits, extracurricular activities, and personal recreation.

The success of the campus is no accident, however. Early on, the pivotal decisions on team composition and integration set the stage for resolving the challenges ahead. During a presentation we made last year at the ERAPPA (Eastern Region APPA) conference, someone asked us about team selection and utilization. The takeaway lesson is to get the right people around the table as early as possible.

In that regard, the decision to use the same civil, landscape, and sustainability consultants throughout a series of overlapping design and building projects and in support of two different architects gave us a highly committed and informed team for the South Campus project. This arrangement also provided consistency in our relationships with municipal and regulatory officials.

To make the new South Campus district project work as planned, the cross-disciplinary team applied empathetic values—exploring ideas as a group, listening to other points of view, and harnessing the potential of team problem solving in ways not often seen in traditional planning, designing, and building. By taking an inclusive, collaborative approach, we overcame a series of challenges to realize the collective vision of a new, vibrant student and staff experience. ⑨

Mark Leighton is director of facilities management at Phillips Exeter Academy, Exeter, NH; he can be reached at *mleighton@exeter.edu*. Peter Reiss is associate principal with ARC/Architectural Resources, Cambridge, MA; he can be reached at *preiss@arcusa.com.* This is their first article for *Facilities Manager.*

The Challenges of an Aging Higher Ed Workforce

By Adam Pritchard, Ph.D., Jingyun Li, M.S., Jasper McChesney, M.S., and Jacqueline Bichsel, Ph.D.

The population of the United States is getting older. According to the U.S. Bureau of Labor Statistics (BLS), older workers—which the BLS defines as those who are 55 and older—made up 22 percent of the U.S. workforce in 2016, nearly double the 12 percent recorded in 1995.[1] This increase is largely "fueled by the aging baby-boom generation, a large group of people born between 1946 and 1964" (currently aged 55 to 73).[2] As baby boomers approach retirement age and exit the workforce in the coming decade, they will be followed by Generation X—a generation that's nearly 30 percent smaller.[3] For HR professionals, these facts present challenges such as salary compression and a shrinking domestic talent pool for key positions in the future.

This brief focuses on the implications of the aging staff workforce in higher education, specifically professionals and nonexempt staff.[4] We analyze the age distribution of higher ed staff, identify the job areas with the largest aging workforce, examine pay equity for women and men with varying levels of experience, and highlight the higher ed staff positions where salary compression is the most common.

AGE DISTRIBUTION OF STAFF

The median age for all higher ed staff is 42.[5] In the overall U.S. workforce, the median age is 42.5. **Figure 1** shows the percentage of employees in each age group among the higher ed staff workforce compared to the U.S. workforce overall. There is a much smaller percentage of younger employees (under 25) and a larger percentage of older employees (over 55) in higher ed than in the overall U.S. workforce.

Employees who are 55 years old and older make up almost one-third (29 percent) of the higher ed staff workforce, whereas less than one-fourth (23 percent) of the U.S. workforce is over 55.[6] Higher ed already has more older employees than the projected U.S. labor force share of 25 percent by 2024.[7] Since higher ed has a greater share of older workers than other industries, it may need to act to address the challenges of an aging workforce much sooner.

STAFF IN HIGHER EDUCATION SURVEY 2019

Figure 1: Percentage of Higher Ed Staff and U.S. Workforce by Age Group
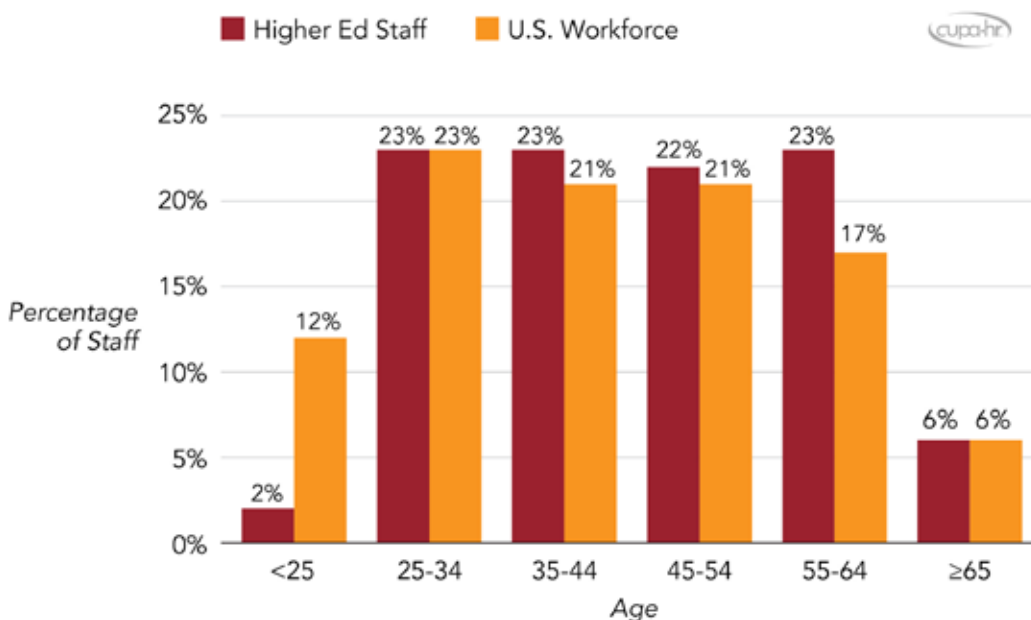
JOB AREAS WITH MORE OLDER WORKERS

Historically, high school students in the United States were routinely taught vocational skills. In the 1980s, American education systems started to shift the focus to academics and to preparing all students for college.[8] Since then, fewer students have been exposed to career options in the skilled crafts. We may be seeing the impact of this change in higher ed staff data. **Figure 2** shows that skilled craft, facilities, and service/maintenance areas have the highest percentages of older workers, each with nearly 40 percent or more of its workforce over 55 years old.

Higher ed institutions may soon have a difficult time competing for new employees to fill these positions. The gap between the jobs that need to be filled and the skilled talent pool will leave an estimated 2.4 million positions unfilled between 2018 and 2028 in the U.S. manufacturing sector alone.[9]

STAFF IN HIGHER EDUCATION SURVEY 2019
Figure 2: Percentage of Workers Over 55 Years Old by Job Area

cupa-hr

Job Area	Under Age 55	55 and Over
Skilled Craft	54%	46%
Facilities	61%	39%
Service/Maintenance	61%	39%
Office/Clerical	63%	37%
Safety & Supervisors	65%	35%
Fiscal Affairs	68%	32%
Other	71%	29%
Information Technology	75%	25%
Technical/Paraprofessional	76%	24%
Institutional Affairs	76%	24%
Academic Affairs	77%	24%
Health Science & Environmental Sustainability	78%	22%
Research	79%	21%
External Affairs	80%	21%
Student Affairs	85%	15%
Athletic Affairs	88%	12%

> " *To effectively tackle the facilities, skilled trades, and service/maintenance position deficiencies, we must invest in new "smart building" technologies and advance technology-rich apprenticeship programs that breed a new type of workforce—one that reflects the rapidly changing nature of the skilled trades from mechanics to technicians, and now to data analysts. With the talent pool shortage, a mass exodus of baby boomers, and increasingly sophisticated and complex building systems, these investments are a critically important part of an institution's overall job planning strategy.* "
>
> —E. Lander Medlin, *Executive Vice President, APPA*

WOMEN'S PAY EQUITY

Figure 3 shows the median salary for male and female staff based on the number of years they have been in their current position, as well as the ratio of women's to men's salaries over the same time frame. Whereas salaries for men show a steady increase with years in position, salaries are largely the same for women with between 8 and 22 years in their position. This suggests that when women stay in the same job long term, their pay increases consistently fall short of raises paid to men.

Pay inequity for women has a dramatic, cumulative effect over a higher ed staff employee's career. Newly hired staff are paid nearly equitably; women are paid a median salary of $45,000, and men are paid $45,410, resulting in a female/male pay ratio of $0.99.[10] However, the pay gap widens with increases in years in position.

At 20 years, women are paid only $0.86 to every $1.00 paid to men. In terms of annual salary, with 10 years in a position, women are paid $4,000 less than men. With 20 years in a position, women are paid $8,000 less than men. Over all 20 years, the cumulative annual pay differences add up to $87,600—and this figure does not include the benefits of retirement matching and potential investment growth over time.

STAFF IN HIGHER EDUCATION SURVEY 2019

FIgure 3: Salary and Pay Ratio by Sex and Years in Position
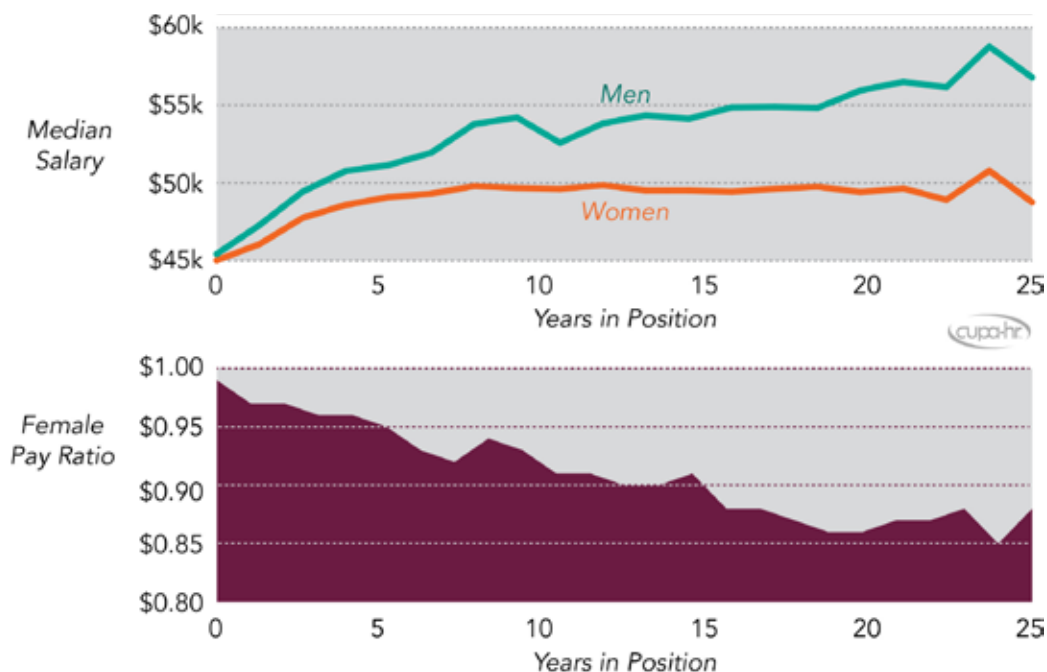
POSITIONS WITH SALARY COMPRESSION

Figure 4 highlights the higher ed staff positions for which more than 30 percent of institutions pay new hires the same or more than the median salary of their longer-serving employees in the same position.[11] When lower-level or less-experienced employees are paid close to or higher than higher-level employees or employees who have been with an institution for many years in the same job, this is known as salary compression.[12] Many other higher ed staff positions experience salary compression, though less frequently than these positions.

Salary compression occurs when current employee raises don't keep up with the increases in market pay rate for jobs, and the supply of qualified candidates is low. To attract talent, employers sometimes need to offer new hires salaries higher than those of more senior employees. Salary

compression has an adverse impact on employee morale, particularly for long-serving older workers, and may even result in lawsuits related to age discrimination or pay inequity for employees from protected classes.[13]

Figure 4: Top Positions Paying Longer-Serving Employees Equal or Less than New Hires
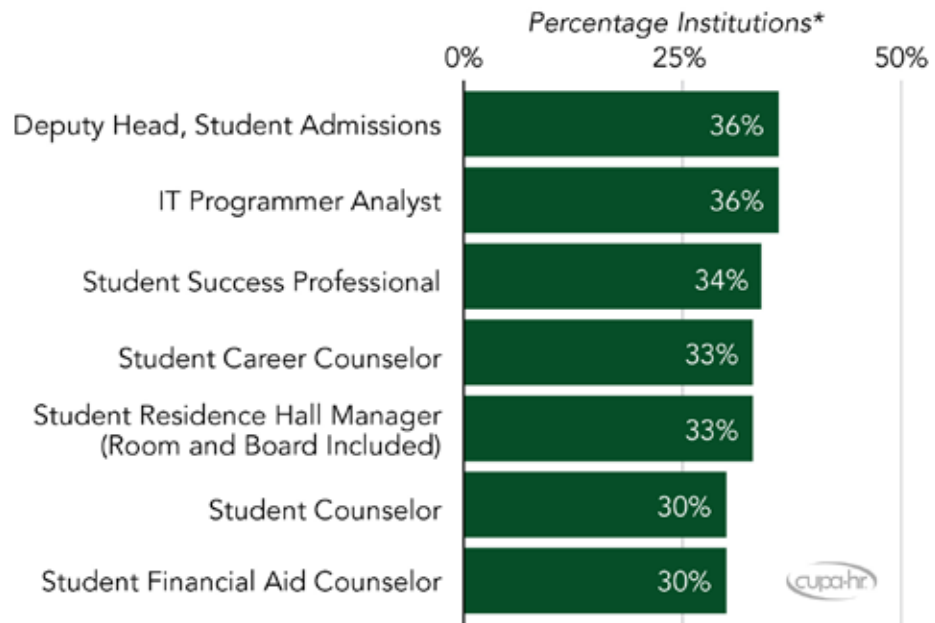

Percentage Institutions*

Position	
Deputy Head, Student Admissions	36%
IT Programmer Analyst	36%
Student Success Professional	34%
Student Career Counselor	33%
Student Residence Hall Manager (Room and Board Included)	33%
Student Counselor	30%
Student Financial Aid Counselor	30%

Based on positions where 100+ institutions reported both new and longer-serving employees in the same position.

SUMMARY

A large part of the overall U.S. workforce is aging, and an even larger part of the higher education staff workforce is following the same trend. With almost one-third (29 percent) of the higher ed staff workforce over the age of 55, higher education leaders must act to ensure that the pipeline for key positions is adequate to fulfill future staffing needs. Seeking external expertise in a competitive job market is going to be more challenging, so efforts to prepare staff for internal promotion must become more of the norm.

Preparing for a large part of the workforce nearing retirement means paying special attention to certain key staff areas. In particular, the areas of skilled craft, facilities, and service/maintenance have a large percentage of older workers. In an increasingly competitive job market, higher ed institutions should develop a plan to anticipate and address these highly competitive job shortages.

To address some of the issues posed by an aging workforce, attention to retention is key. For example, for higher education staff, pay equity for women decreases with more time in position. Given the current political climate and increasing awareness of pay inequity, retention of women in staff positions may increase if pay equity issues are addressed proactively.

In addition, several positions in higher education are experiencing salary compression, where newer workers are paid the same or better than longer-serving employees within the same job. Identifying and addressing salary compression issues may also help with retention efforts long-term.

ENDNOTES

1. Toossi, M., & Torpey, E. (2017, May). *Older Workers: Labor Force Trends and Career Options.* U.S. Department of Labor, Bureau of Labor Statistics.

2. Ibid.

3. Fry, R. (2018, March 1). "Millennials Projected to Overtake Baby Boomers as America's Largest Generation." Pew Research Center.

4. Salary and demographic data for higher education professionals and nonexempt staff are sourced from the 2019 CUPA-HR *Professionals in Higher Education Survey* and *Staff in Higher Education Survey.* Data include 446,844 staff in 540 different positions. Annualized salary data were collected and standardized according to procedures set forth in the *Professionals and Staff Survey Participation and Information Templates.*

5. U.S. Department of Labor, Bureau of Labor Statistics. (2018). *Employed Persons by Detailed Industry and Age* (Table 18b).

6. Ibid.

7. U. S. Department of Labor, Bureau of Labor Statistics. (2015, December). "Labor Force Projections to 2024: The Labor Force Is Growing, but Slowly."

8. Jacob, B. (2017, October). *What We Know About Career and Technical Education in High School.* (Report). The Brookings Institution.

9. Giffi, C., Wellener, P., Dollar, B., Manolian, H. A., Monck, L., & Moutray, C. (2018). *2018 Skills Gap in Manufacturing Study; Future of Manufacturing: The Jobs Are Here, but Where Are the People?* (Report). Deloitte.

10. Median pay ratios are controlled for position. Median salaries by sex for each specific position were obtained; then the median of those medians was calculated for both men and women for each position area. This controls for the fact that women are represented differently in specific positions that may pay higher or lower salaries than other positions, and it means that the wage gaps present are not explained by the fact that women have greater representation in lower-paying positions.

11. A total of 677 institutions reported positions with both new hires and existing employees and were analyzed for compression when at least 100 institutions reported both new and existing staff.

12. Kochanski, J., & Stiles, Y. (2013, July 19). "Put a Lid on Salary Compression Before It Boils Over." Sibson Consulting/The Segal Group.

13. Ibid.

Recommendations for University Tree-Care Programs

By Mikaela Schmitt-Harsh, Ph.D., and P. Eric Wiseman

University and college campuses are major hubs of employment, education, and economic development. They are communities unto themselves and play an important role in people's livelihoods and well-being as they work, study, and recreate. An important aspect of that campus experience is the quality of the natural environment, and trees play a central role in defining the campus landscape. How trees are managed on campuses impacts many aspects of institutional operations, ranging from safety to sustainability to energy and infrastructure costs.

THE SURVEY

In 2017 and 2018, a web-based survey, conducted under the auspices of APPA's Center for Facilities Research (CFaR), was disseminated to colleges and universities in the United States and Canada, to collect information about the ways in which campus trees are managed. Individuals contacted to participate in the survey included campus arborists and facilities staff members who are active in campus tree management efforts.

There were 378 responses to the survey (response rate indeterminate given sampling approach), including institutions from 4-year public institutions, 4-year private not-for-profit institutions, and 2-year public institutions. Several universities with active Tree Campus USA certification responded to the survey (36 percent), although the majority of respondents do not currently take part in the program (64 percent).

SYNTHESIS OF FINDINGS AND RECOMMENDATIONS

A summary of survey results is available in the September/October 2019 edition of *Facilities Manager* magazine (the full report is available here: *https://www.appa.org/cfar-completed-projects*). Described here is a synthesis of findings situated within a set of recommendations for colleges and universities that aim to promote effective management and stewardship of campus trees. These recommendations are rooted in an extensive review of the urban forest sustainability literature (e.g., Clark et al., 1997; Kenney et al., 2011) and informed by institutional responses to this survey. These recommendations are neither exhaustive nor do they represent an endorsement of one action over another.
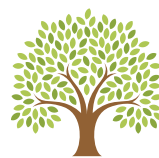
1. Sustained planting to maintain tree stocking and canopy cover
Natural attrition of trees, along with displacement by development, are major challenges to sustaining campus urban forests. The long-term provision of ecosystem services depends on a strong, sustained effort of annual tree planting to maintain adequate stocking and canopy cover. In

recognition of this, cities across North America (and beyond) are increasingly setting tree planting goals—a trend that is beginning to take shape on university campuses as well. In this study, 20 percent of responding institutions currently have a tree planting goal; another 16 percent are in the process of developing one. There is no *one* universal way to set a tree planting goal, and in this study, institutions identified a variety of approaches. Some provided a final tree planting count to be achieved by a given date (e.g., 100 trees by 2022); others a certain number of trees planted each year (e.g., 15 trees per year for 20 years); and others a goal based on replacement (e.g., one-for-one replacement).

Inventory data (see Recommendation #2) can be used to strategically plan current *and* future locations of tree planting efforts, as well as track locations of attrition. Ideally such plans would be crafted to go beyond planting in vacant spaces and routine tree planting efforts associated with capital projects (Stewart and Wiseman, 2018). Rather, more systematic planning of tree planting efforts, including *where* to plant, *what* to plant, and *how* the tree will be maintained to optimize its role in the ecosystem, should be considered.

2. Comprehensive tree inventory

Comprehensive tree inventories are critical to establishing baselines (*what do we have?*) from which future targets and goals can be determined (*what do we want?*). Such inventories can have a range of possible uses; among the most important is to aid landscape planning efforts. Inventories can also be used by students, faculty, and facilities staff to model the ecosystem services and economic value of the campus forest. In total, **tree inventories are an integral step toward understanding the existing resource base, and the opportunities and constraints for growth in the future.**

In this study, 67 percent of the responding institutions indicated they have some level of a tree inventory, with just over 50 percent of these computerized. The extent to which these inventories maintain information for *all* or just a *portion* of the campus landscape is unknown. To be most successful, a comprehensive tree inventory should include *all* campus trees— planted and emergent—that are greater than a designated size, for example, 1-in. diameter at breast height (DBH). Collection of attribute data that extends beyond tree species and location, such as dimensional measurements (height and diameter), health and structure ratings, and maintenance recommendations, will help with modeling (for example, using i-Tree tools) and planning efforts. Since inventories can be time-intensive and therefore costly, early efforts should be made to identify how the inventory data will be used. Pending adequate support and resources, trees should be reinventoried periodically to monitor changes in the composition and health of the campus tree population.

3. Tree canopy cover assessment

A complementary assessment to field tree inventories is a tree canopy cover assessment, particularly for campuses that cover large geographic areas. **Canopy assessments can help decision-makers better understand the spatial arrangement of tree resources, and more accurately track changes to tree canopy over time.** In this study, 76 percent of responding institutions provided a canopy estimate for their campus, with values ranging from 1 percent to 95 percent. The wide variability in canopy cover across institutions can be attributed to several factors (e.g., local environmental conditions, size of campus, or historical legacy); from a purely methodological standpoint, the wide range may simply be the result of incomplete or absent canopy data. Just under 10 percent of those that provided a canopy estimate cited that it was an "accurate record." And since an accurate understanding of what the current resource base looks like is needed to inform the development of future targets, it makes sense that just 9 percent of responding institutions currently have a tree canopy goal.

With greater availability of remote sensing technology, including finer-resolution satellite imagery, canopy assessments can provide university staff with a more automated, rapid estimation of the campus tree population. Such assessments can be performed in collaboration or consultation with faculty and students interested in hands-on, application-oriented research. Freely available web-based canopy assessment tools, such as i-Tree Canopy and i-Tree Landscape, are good places to start in the examination of tree cover. Where possible, institutions

should examine not only their current or "actual" canopy cover, but also their maximum "potential" canopy cover (Kenney et al., 2011), which gives a better account of tree cover relative to available plantable space.

4. Strategic planting to enhance resilience and ecosystem

Plant more trees, but *which* trees should be planted? Maintaining a diverse mix of trees that are suitable to the growing environment *and* to the desired function at the site is critical to promoting a healthy, resilient urban forest (Kenney et al., 2011). Thus, future stocking of the campus forest should give consideration to planting a diverse mix of species that are proven performers on campus and that are resilient to pests, weather, and other known stressors in the area (Stewart and Wiseman, 2018). Though this will certainly vary by location and environmental context, efforts should be made to plant and maintain a diverse age distribution of trees (Kenney et al., 2011) and a reasonable mix of small-, medium- and large-maturing species. While native species are desirable elements of the plant palate, many urban sites have harsh growing conditions, and the planting of native species alongside a cautious selection of nonnative species may be needed to create a more resilient campus forest (Sjöman et al., 2016). Collectively, these recommendations aim to minimize maintenance costs and optimize the provisioning of ecosystem services.

Further, the services that trees provide to the economic and environmental bottom line of universities should be recognized as capital projects are planned. There are now many examples of student- and faculty/staff-led projects to inventory campus trees and quantify their ecological and economic value; however, such projects rarely inform tree care practices, including the selection and planting of trees. In this study, respondents identified a range of reasons to plant trees; however, "aesthetics" was by far and away the clearest indicator of tree planting efforts. As many universities are making commitments to campus sustainability efforts, **creating a culture of campus forest stewardship and sustainability that goes beyond beautification should be encouraged.** Rather, proactive recognition of the need to achieve carbon neutrality goals, improved stormwater management, and provision of pollinator habitats better recognizes the vital role trees play in the campus ecosystem.

5. Cradle-to-cradle tree management approach

Tree removals on campus are a regular part of tree maintenance and grounds management. In this study, the reasons for tree removal often varied—from tree death to insect/disease problems to conflict with a capital project. After removal, tree "waste"—the logs, brush, stumps, and chips—may be disposed of in many ways, with varying costs incurred with each method. Because the expansion and densification of college campuses may bring with it loss of tree cover, efforts should be made to close the proverbial loop and support a cradle-to-cradle system whereby "waste" products from felled trees are reutilized. Many responding institutions indicated they are creating mulch (78 percent) and firewood (41 percent) from campus trees, but the degree to which such practices are utilized relative to the total production of tree "waste" is unknown. A surprising 23 percent of respondents indicated they are processing trees into lumber for reuse either on- or off-campus, although again, the frequency of such practices was not ascertained.

The idea of wood reutilization and upcycling is drawing more and more attention from researchers, arborists, municipalities, woodworkers, campus facilities, and more. Some institutions currently have established repurposing programs, including on-campus sawmills, kilns, and other equipment (see for example, Michigan State University's Shadows Collection). Such programs can readily engage students in hands-on experiences and training concerning a wide range of issues, from urban
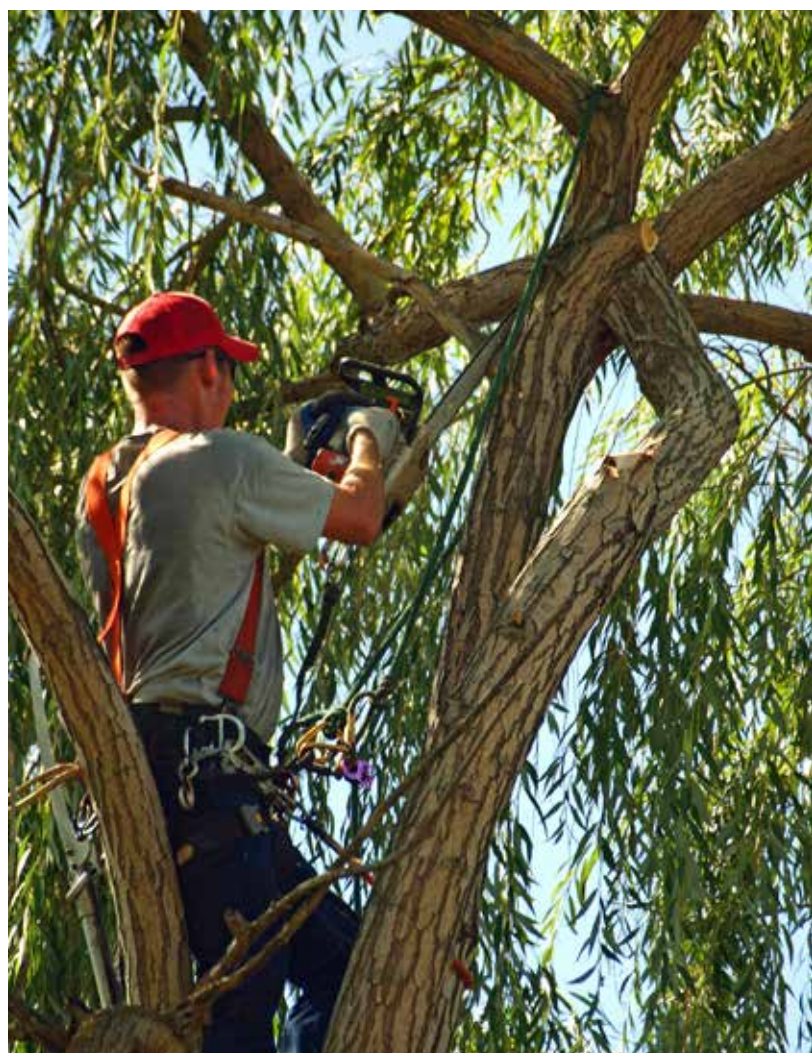
forestry to arboriculture to waste management to sustainability. Regardless of having resources and equipment available on campus, **an effective campus wood waste program would treat felled wood as a usable, and sometimes marketable, product.** Careful reuse and recycling can reduce disposal costs and reduce the environmental consequences of tree felling (e.g., lost carbon to the atmosphere).
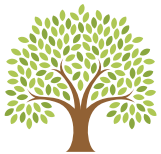
6. Opportunities for staff training and attainment of specialized credentials

The planting, care, and removal of trees on campus requires staff with necessary training and qualifications, and adequate resources available to support their efforts. Defining an "optimal" number of employees who are involved in campus tree care is tricky, as it varies among institutions, making staffing an inappropriate benchmark. Perhaps a better criterion would seek to address training, skill, and experience of facilities staff. The science and practice of arboriculture has advanced considerably in recent years, and there are now a number of standards, best management practices (BMPs), and credentials that could be employed to advance tree care practices on campus. Where possible, employing a Certified Arborist on campus whose sole responsibility is to oversee the comprehensive and systematic management of the campus forest is recommended. While many aspects of tree care likely fall within the capabilities of grounds staff, certain aspects of risk, pest, and construction management may require advanced training and skill sets. Therefore, increasing opportunities for staff training and attainment of specialized credentials is advised.

Budgetary allocations should be made to the grounds division

that align with the asset value of campus trees. Interestingly, respondents of this survey study were split in their attitudes toward their budgetary allocations. Roughly half of all respondents indicated they were satisfied with their current budget; one-third were dissatisfied, and the remaining were indifferent. Roughly half of responding institutions indicated their budget was adequate to meet identified needs of current and future projects, while the remaining half indicated their budget was not adequate.

There are many competing interests for campus grounds maintenance efforts that can limit or constrain available resources for tree care and protection. Without adequate resources, sufficient maintenance and systematic care of campus trees cannot be performed, which can lead to a triage-oriented, reactive approach to tree management (Stewart and Wiseman, 2018). This approach contributes to inefficiencies in operations and diminished quality of the tree resource, resulting in greater liabilities and fewer ecosystem services. Thus, efforts to align budgetary allocations to the value of campus trees—economic and environmental—should be made. Tree inventory data and the modeling of ecosystem services (see Recommendations #2 and #4) will enable institutions to better capture the value of campus trees.
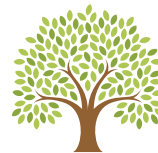
7. A comprehensive systematic tree care plan

To sustain the character and contributions of campus trees requires a proactive, comprehensive, and planned *systematic* (as opposed to reactionary) approach. A good first step toward developing a comprehensive tree management plan could be modeled after the Arbor Day Foundation's Tree Campus USA "Campus Tree Care Plan" standard. This standard posits that a Tree Care Plan should be goal oriented, education oriented, and provide clear guidance for planting, maintaining, and removing trees.

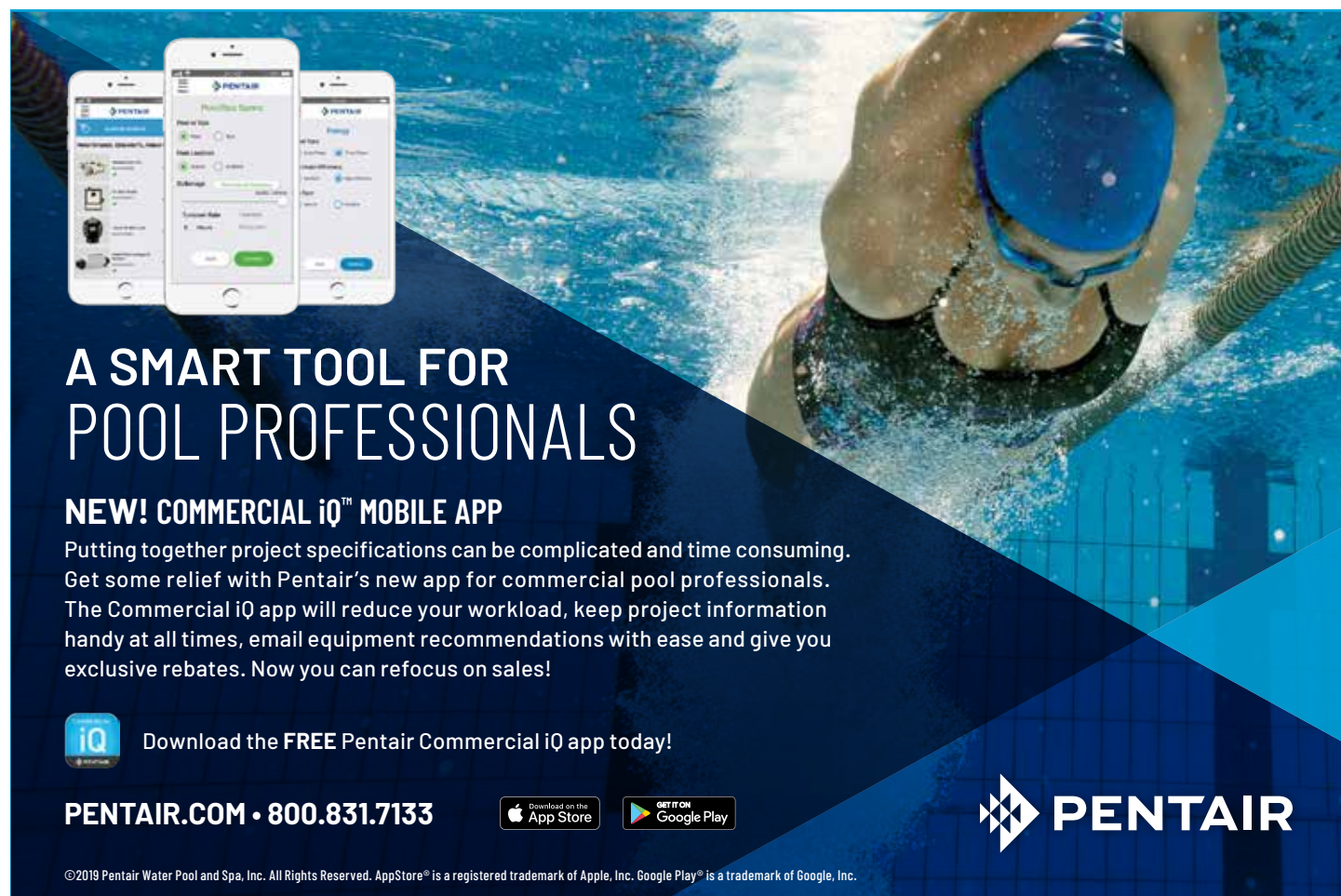A tree management plan should also lay out strategies to

monitor and plan for diseases and pests, as early detection may enable resources to be more readily accessible for deployment in the event of an outbreak. A good tree care plan also identifies policies and procedures for managing campus trees. Without clear directives and oversight, campus trees are vulnerable to harm from any number of activities ranging from construction projects to student events. Damage to root systems and the soil they occupy is a primary source of stress for campus trees, particularly the most valuable veteran trees.

To achieve the most success, immediate and plans for tree care should also be incorporated into campus master plans. Commitment and support from leadership toward tree and forest stewardship will promote greater recognition of the important role trees play on campus, and the ways in which students, faculty, staff, and community members can interact with and benefit from the campus forest. ✑

LITERATURE CITED

Clark, J. R., Matheny, N. P., Cross, G., & Wake, V. (1997). A model of urban forest sustainability. *Journal of Arboriculture* 23(1): 17-30.

Kenney, W. A., van Wassenaer, P. J. E., & Satel, A. L. (2011). Criteria and indicators for strategic urban forest planning and management. *Arbo-riculture and Urban Forestry* 37(3): 108-117.

Sjöman, H., Morgenroth, J., Sjöman, J. D., Sæbø, A., & Kowarik, I. (2016). Diversification of the urban forest: Can we afford to exclude exotic tree species? *Urban Forestry & Urban Greening* 18: 237-241.

Stewart, P. W., & Wiseman, P. E. (2018). *Inventory and Analysis of Landscape Trees and Urban Forests on the Main Campus of Virginia Tech in Blacksburg, Virginia.* Faculty Works, Department of Forest Resources and Environmental Conservation, Virginia Tech. Retrieved from *https://vtechworks.lib.vt.edu/handle/10919/86179.*

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The Campus Fire Marshal

By Alan Sactor

Have you ever thought about what it's like to be the fire official at a major university? Think about this: tens of thousands of students—many of whom are residents; thousands of faculty and staff; millions of dollars in construction and life safety systems to review; a number of different types of buildings to inspect, including those with energy-generating equipment; a multitude of visitors to stadiums, arenas, and large events; a critical role in active threat management; and even having to meet the challenges of fire safety in off-campus student housing. That's not to mention the need to assess the hazards and risks for cutting-edge research—some of which can push the code to the limit—with the university's reputation and prestige on the line. The role of the campus fire marshal has become more complex and diverse in the last two decades. Today's campus fire official can be responsible for what is essentially a city with many unique challenges.

AUTHORITY AND RESPONSIBILITY

Campus fire safety has grown into a specialized area of fire protection, with the campus fire marshal becoming a common position. Twenty years ago, there were very few colleges or universities that had fire marshals. There certainly were campus fire prevention programs with dedicated and committed staff, but few had authority beyond what was provided by their administration. Today, more campus fire marshals, mostly at state schools, have legal authority from the state fire marshal either through the law, memorandums of understanding, or other agreements. This would include campuses such as the University of

Oklahoma, the University of Maryland, Georgia Tech, Texas A&M, and the University of California system campuses. A significant advantage for campuses that serve as their own authority having jurisdiction (AHJ) is the ability to ensure that facilities are designed to meet the needs that serve the institution's mission, especially in the area of research.

Campus fire safety as it applies to research and development is dynamic, sometimes without prescribed codes and standards to rely on for guidance. The campus fire official must make detailed hazard and risk assessments when faced with a proposal for a grant, new research start-ups, or modifications to existing research by principal investigators (PIs). The research community consists of talented individuals whose research grants are highly sought, bringing the campus significant funding and prestige branding. Many people envision a college laboratory as a collection of students performing tabletop experiments with Bunsen burners heating samples in test tubes.

Undergraduate labs often resemble this vision; but more and more, campus laboratories are performing grant-driven research that utilizes more exotic hazardous materials, including pyrophoric liquids and gases, water-reactive solids, and highly toxic gases. Campus fire officials are tasked with assessing the processes for hazard analysis and standard operating procedures, and with researching a variety of codes to verify compliance. In cases where a campus fire marshal has the authority, equivalencies for code requirements may be evaluated for approval.

Standards such as NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals, and NFPA 55, Compressed Gases and Cryogenic Liquids Code, are commonly used by campus fire officials to gain fire safety compliance. In jurisdictions where the 2018 edition of the International Fire Code (IFC) is used, a new chapter 38 on higher education laboratories has been added to address this unique need in higher education institutions. The development of the new chapter was the result of the leadership and work of campus fire officials. IFC chapter 38 is an excellent example of campus fire officials using their specialized expertise to

work within the consensus code development process to address the need to safely accommodate research activities. The chapter increases the maximum allowable quantities (MAQ) of hazardous materials—or in some cases the use of previously prohibited materials—in older non-sprinklered research buildings, by increasing equivalent safeguards.

FINDING COMMON GROUND AMID HAZARDS

The nature of hazards associated with research in laboratories makes them a focus of attention for campus fire officials as well as laboratory safety professionals. Finding common ground with safety precautions and the understanding of hazards associated with their processes is still delicate work in the research environment. Despite close working collaboration and specialized training with lab workers, fires do occur within campus laboratories. In addition to the inherent fire hazards of flammable chemicals, gases, pyrophorics, and other materials in various physical states, a significant number of fires are due to electrical causes. Faulty appliances igniting flammable vapors, improper fire safety and grounding measures with electrical equipment fabricated in the lab, and unsupervised processes are factors that have contributed to laboratory fires. Many educational facility managers are probably familiar with the electrical and power issues associated with some research, especially high-energy research. Engineering measures such as incorporation of toxic gas monitoring systems can be attributed to preventing lab fires or limiting damage from an occurrence. Implementing campus facility management policies on researcher access to building electrical systems is also helpful.

Off-campus housing may not be directly related to an educational facility manager's responsibilities, but it is a challenge for campus fire officials. Even though off-campus housing is generally not within the jurisdiction of the campus fire official, it is where students live. Off-campus housing is worth mentioning because, unfortunately, it is the place where most student fire fatalities occur. It also demonstrates the extent to which the installation, testing, and maintenance of fire protection systems—along with educational programs and enforcement—have improved fire safety in on-campus residential facilities.

AND OFF-CAMPUS, TOO

Nearly all campus fire safety officials wrestle with the challenge of improving the safety of students residing off campus. The rules that apply on campus and the advanced fire protection features and systems (including sprinklers) that give on-campus residents added measures of safety, are typically much less prevalent in off-campus dwellings and multifamily living conditions. According to U.S. Fire Administration statistics (for the years 2000-2015), 90 percent of fatal campus fires occur in off-campus housing with smoking being the leading cause (29 percent). Smoking in campus residence halls is typically prohibited. Alcohol, another item that is typically prohibited or restricted in on-campus housing, was a factor in 78 percent of fatalities. Working smoke alarms were present in only 42 percent of off-campus fatal fires.

Most students who choose to reside off campus are more focused on freedom and independence from campus regulations and/or lower costs than they are on the fire safety features of their dwellings. Campus fire officials approach this challenge through education and relationships. This includes, but is not limited to, educating the students and their parents seeking housing off campus on the basic fire safety features of working smoke alarms, adequate exits, and safe electrical and heating systems. Establishing working relationships with landlords to encourage them to make necessary improvements within their rental properties can be effective.

Fraternities and sororities, where officially recognized by the college or university, can often be included in on-campus fire safety education programs and benefit from campus fire safety official expertise. Organizations such as the Center for Campus Fire Safety have worked diligently through panel discussions at Campus Fire Forums, where innovative outreach programs are discussed, such as one that links emergency medical services (EMS) calls with fire safety assessments run by the City of Berkeley, California Fire Department/EMS. The need to reduce off-campus fire deaths and emergencies will be a top priority for years to come.

The year 2019 marks two decades since the first national forum on campus fire safety, an invitation event held in 1999 with campus and public fire officials, hosted by NFPA and the U.S Fire Administration. As a result of that forum, the discussion and sharing of information among campus fire officials has increased dramatically. From building construction and life safety systems to hazardous materials and public education, campus fire officials have become more prepared to fulfill their role in addressing the myriad of challenges presented by the college and university environment.

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APPA's CEFP Credential: Keeping Pace with Today's Educational FM Professional

By Christina Hills

As the educational facilities management profession grows more complex, employees are challenged to keep pace. Collaborating in a matrixed environment with other departments, dealing with aging infrastructures and coping with budget reductions and skills gaps all mean today's employees will need to work smarter – not just harder – to meet the demands of today's educational in-

stitutions. Hence, moving beyond the old adage, "do more with less" to "doing different with less!"

One way to ensure that employees are ready to meet these challenges is through broad exposure to all the areas of educational facilities management, and APPA's Certified Educational Facilities Professional (CEFP) credential is the best way to demonstrate their proficiency.

According to the U.S. Bureau of Labor Statistics, 48 million people in the United States held a professional certification or license last year, and nearly 25 percent of them were in a service industry. Statistically, certifications rise proportionally with education levels, and for those without advanced education, a professional certification can demonstrate knowledge, skills, and abilities needed for a specific job. In fact, in 2018, those with a professional certification or license had a lower unemployment rate than their non-credentialed counterpart.

For educational facilities professionals, earning the CEFP can bring not only professional endorsement, but personal validation, because APPA certification is the *only* facilities credential that focuses on professional development while encompassing the full multidisciplinary range of FM principles and practices targeted to the education industry sector.

A THREEFOLD APPROACH

The purpose of APPA's certification program is threefold:

1. Assure educational institutions of the quality of their professionals:
When an employee demonstrates competence and

1 ASSURE EDUCATIONAL INSTITUTIONS OF THE QUALITY OF THEIR PROFESSIONALS

2 DRIVE PROFESSIONAL DEVELOPMENT

3 ESTABLISH INDUSTRY STANDARDS

CEFP — Certified Educational Facilities Professional
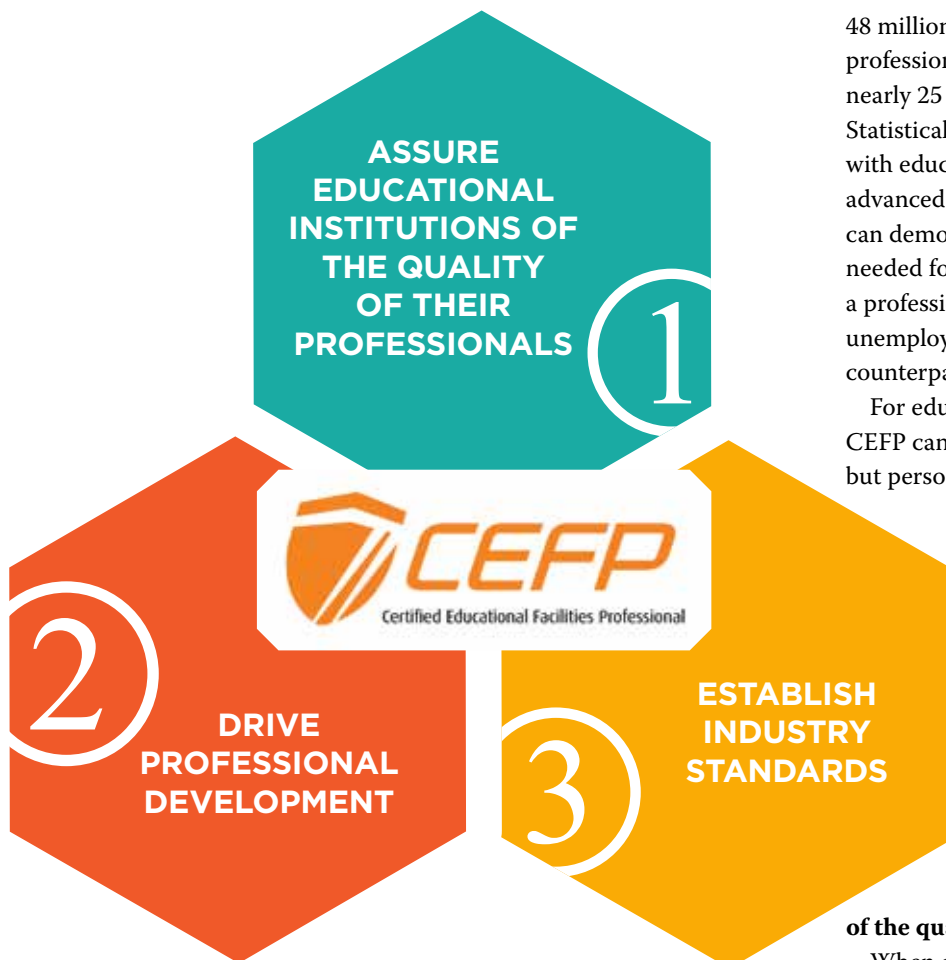
professionalism through the CEFP, an institution can expect to see that person leveraging knowledge and expertise to transform their institution into an inviting and supportive learning environment and in turn, elevating the value and recognition of the facilities profession.

2. Drive professional development:

To maintain the CEFP credential, a person must demonstrate their continuous learning by recertifying and earning 120 credits ("APPA units") every four years. APPA units are gained through numerous ways, including work experience, professional development programs, leadership roles as well as volunteer work within the profession. For instance, a fulltime employee earns 10 units/year, so 40 of the required 120 units are earned just by going to work every day.

Recertification validates your commitment to the profession, lifelong competency, and professional development. When you recertify, your peers, employer and the public continue to see that you are dedicated to the profession and committed to the gold standard that the CEFP represents.

3. Establish industry standards:

The CEFP examination is based on an industry-wide set of tasks required for educational facilities professionals. These core competencies ensure that everyone who holds the certification has been exposed to a multidisciplinary array of relevant information that can be applied on the job or when collaborating with other teams.

The CEFP is referred to as "The Measure of a Professional," and employers can use the CEFP as a tool to recruit well-trained applicants who can become high-performing employees, capable of future leadership roles.

MAKING THE CEFP CREDENTIAL MORE ACCESSIBLE

Recently, after studying trends in the educational facilities management industry, APPA recalibrated its eligibility qualifications in order to make the CEFP more accessible. Now, with only eight years of combined education and related experience, a person can begin the certification process. For example, for those with a four-year degree in any subject, only four years of facilities-related work experience are required.

The process of earning the CEFP is simple; it can be done completely online whenever and wherever it's convenient. Employees don't have to miss work

to attend to an off-site training class, so there are no additional travel expenses.

APPA provides 24/7 access to their state-of-the-art customized interactive learning (CIL) system, which includes a 13-week prep course. Participants work at their own pace but have access to live and recorded webinars. A cohort group ensures that everyone has the option to learn from and network with their peers. Now, that's collaborative peer-to-peer learning at its best!

Following the prep course, applicants take the examination online either at a testing center, remotely using a webcam, or on their campus. The exam consists of 110 multiple-choice questions and a series of scenario-based case study questions.

APPA REGIONS LEND A HAND

Since APPA members are also members of a region, they can take advantage of reduced fees (and in some cases, free) to earn the certification. APPA regions understand that everyone benefits from well-rounded educational facilities management professionals, and they offer this discount as a benefit to their members. However, many regions have capped the number of discounts they offer each year, so interested professionals should contact their region right away to take advantage of this offer.

"APPA-certified professionals who have earned this respected credential distinguish themselves among their peers," says Lander Medlin, APPA's executive vice president. "CEFP certificants report that while they gained skills that were immediately applicable to their job, the personal validation that comes from this achievement stands out to them—this kind of recognition cannot be measured simply by a job description."

APPA also has a program called Pathway to Professionalism (P2P) that will bring this learning option to your campus. If you have 20 or more people to train, APPA will provide all the same benefits contained in the online learning platform, as well as four in-person sessions at your location with a trained facilitator at no additional cost. Ⓢ

Christina Hills is APPA's director of credentialing and benchmarking, and can be reached at *christina@appa.org*. For complete information about APPA's certification program, please visit *https://www.appa.org/certification/*.

Building Blocks of Culture for Facilities Management – Part III, Define Roles of Individuals and Leaders

Matt Adams, P.E.

I n our last column on culture, we continued to discuss the importance of culture as a management tool. In addition, we started to outline the building blocks associated with purposefully building and nurturing culture within our organizations. The second building block discussed previously was that of defining our values and measuring our baseline.

"Clarifying the Value System and breathing life into it are the greatest contributions a leader can make."

Peters and Waterman—*In Search of Excellence; Lessons from America's Best Run Companies*

To be proactive in cultivating our culture, we must carefully select the values that we want our culture to be based upon. This selection process involves a cross-section of our staff in all areas. We want to create a culture that engages them, and is based on the values that they find most important in their workplace.

Once these one or two highest priority values are selected, an initial baseline measurement of the current culture must be completed (an example was provided from the University of Chicago on how to create an empirical scale to measure culture within our organization). This tool helps indicate the norms, bias, attitudes, and behaviors that define our current culture. Next in our path to creating culture is Part III – Defining the Roles of Individuals and Leaders.

REQUIRED: ACTIVE PARTICIPATION FROM STAFF

Once again this building block requires active participation from a wide cross-section of our staff. In the past this work may have been done only by the senior leaders of our organization or external consultants alone, and this has proven to be unsuccessful. Only our staff (who spend one-third of their life in the workplace) understand what makes that workplace engaging to them.

Demonstrating these values through various behaviors becomes the basic substance of our organizational culture. It is not only the large gestures that prove our culture is based on one value or another, but the minute daily individual actions that add up—one after another into thousands—over weeks, months, and years. It is the hard work of determining these actions that define our culture, and must come directly from our staff. Providing guidance and facilitating the process are of utmost importance in this process.

For most within our organization there are four basic working relationships. They are:
- Me and my leader
- Me and my customers
- Me and my peers
- Me and my direct reports
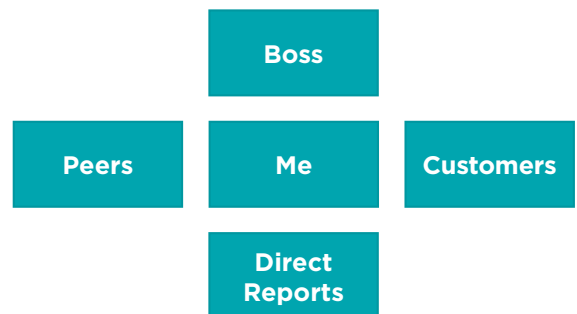
For many, all four of these working relationships apply, although for those without direct reports, only three apply. It is the roles we play in these relationships that provide the relational (or human) basis

of our organization's culture. We each individually influence culture by our actions in these roles. The way we influence culture can be described primarily by these actions:

- Demonstrate
- Reinforce
- Educate
- Enable
- Encourage
- Clarify
- Benefit
- Coach

These actions in general apply to everyone in the roles that they play. Their definition or framework provide a template for interactive working relationships with a variety of staff, and serve to list specific actions that reinforce our cultural values. For example encouragement can take many forms. How it applies to individuals specifically allows for creativity and flexibility for your teams, and are necessary for creation of our culture.

SPECIFIC ROLES PLAY A PART

While the previous rules apply to everyone. There could be more specific roles depending on your position within the organization. In particular, the leadership of our organization plays a vital role in nurturing our culture. Although it is important to note that the leaders do not solely control the culture of our organizations, their role is very important.

Senior Leadership

Many of our peer organizations rely only on the energy of senior leadership or a single senior leader, but that alone cannot sustain a desired value-based organizational culture. The proper roles of our leaders for this initiative are:

- Intentionally support culture
- Live by example
- Recognize successes
- Promote to campus at large
- Make conspicuous efforts
- Identify champions

Champions

The champions are those individuals that leverage the leader's ability to positively nurture value-based culture within the organization. As used in other management best practices within APPA, identification of champions accelerates and solidifies any change within our organizations. In this case,

leadership relies on champions at various levels within the organization to promote this new value-based culture and to lead by example. They are force multipliers, and their roles include:

- Cheerleaders for teams
- My "go to" people for impact
- Referent leaders
- Set examples

Staff

Naturally, everyone in our staff plays a role in organizational culture. The guidelines for the role of each staff member are:

- Individual action plan
- Provide feedback
- Encourage peers
- Adopt new behaviors
- Support leadership in efforts to improve culture

IMPLEMENTATION

Consistent with the other building blocks, much of the work in Part III is based on providing guidance in a framework that will allow everyone within the organization (including our leaders) to suggest, and later specify, unique actions and artifacts that create our culture. These defined rules are the starting point of facilitated discussions meant to identify short-, medium-, and long-range actions that demonstrate our culture. The working sessions create what ultimately becomes the implementation strategy for our organizational culture change.

This work was recently applied to the organizational culture initiative at the University of Chicago. The same definitions of roles were used to facilitate many group discussions to learn from the staff at all levels of the organization.

From these meetings, a large number or actionable ideas unique to that working environment were collected. It will be those ideas that will form the basis for Part IV – Publish Cultural Implementation Strategy. Ⓢ

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Matt Adams is president of FM², Atlanta, GA. He can be reached at *matt@fm2.biz.*

Beyond Code Requirements: How Distributed Antenna Systems are Critical to Building Operations

By David K. Glenn, RCDD, CTS-D, LEED AP BD+C

As a follow up to the first Technology & Trends column on two-way radios, in this column I discuss how facilities management (FM) must also understand the importance of distributed antenna systems (DAS). Even among some professionals, incorrect terminology and questions abound about DAS. The topic mainly comes up during initial scope discussions for qualifications and proposals for new construction or major renovation projects, but it may be revisited at any time during a project—and hopefully **before** construction begins!

There are really two distinct purposes for DAS, although they are often mistakenly linked in discussions. One is for cell phones, and the other is for public safety communications, such as police, fire, and emergency medical services (EMS). These first responders use licensed-frequency radios that are in many cases similar to radios used by FM, campus security, housekeeping, and engineering professionals.

A DAS may or may not be needed in a building, depending on the radio frequency (RF) conditions of the built environment of the facility and surrounding areas. Per the National Fire Protection Association (NFPA) and International Fire Code (IFC), public safety radio reception is an absolute requirement. While cell service is not required by code, it is always expected by all occupants and visitors.

Traditionally, the default approach to both radio reception and cell service has been to simply build the building and "see what happens." This approach can work in some areas where there are emergency responder antennas as well as cell towers in close proximity to the facility, in which case you might expect these services to sufficiently penetrate the building. But with the increase in steel structures and low-emissivity (Low-E) glass envelopes (which reflect many higher radio frequencies), waiting to see what happens results in continued disappointment. If the building has subgrade levels, parking garages, or utilized high-efficiency Low-E glass, you likely will require a DAS.

PUBLIC SAFETY DAS

- Also commonly referred to as first responder DAS, emergency responder DAS, or emergency responder radio communications system (ERRCS).
- Supports first responder VHF and UHF frequencies.
- Required by NFPA and IFC with stringent signal strength and floor-area coverage requirements. Occasionally there are additional requirements beyond the NFPA and IFC that many authorities having jurisdiction (AHJs) require. Many jurisdictions have a public safety DAS specification, guide, or document clearly outlining the additional performance, documentation, commissioning, and verification requirements for their jurisdiction.
- Public safety DAS is similar to a cellular DAS passive system, except for some additional fire-rated components, National Electrical Manufacturers Association (NEMA) enclosures, emergency power requirements, acceptance test procedures, etc. Depending on the jurisdiction and floor plans, certain components of the two systems may even be combined, except in larger buildings and those with high occupancies per square foot.

CELLULAR DAS—PASSIVE SYSTEM

- Typically used in smaller, less complex stand-alone buildings.

- A passive system uses bi-directional amplifiers (BDAs), essentially a repeater system taking the off-air signal from the roof and boosting it within the building. Passive systems are relatively easy to design and install. For 4G and earlier technologies, there are also minimum requirements for carrier approvals and negotiations, since they are simply rebroadcasting the macro network signal.
- Some BDA manufacturers are beginning to support 5G—although not with all carriers yet, and they are currently classified by the Federal Communications Commission (FCC) as industrial devices and require carrier approval for now. This should change in the next year, as more 5G BDAs come to market and the various carriers determine their 5G strategies.

CELLULAR DAS—ACTIVE SYSTEM

- Usually deployed in larger, more complex facilities such as campus environments, airports, stadiums, large venues, and buildings typically greater than 500,000 sq. ft.
- Active cellular DAS or neutral host DAS can require a significant amount of coordination with the cellular carriers and approval processes. Owners and contractors can quickly become bogged down in the legal contracts between owners and carriers as well as the various market dynamics. Active systems are expensive due to the neutral host headend equipment as well as the cost of base stations that must be provided by the carriers. There can be a significant amount of equipment in a data room or in an isolated carrier service provider room.
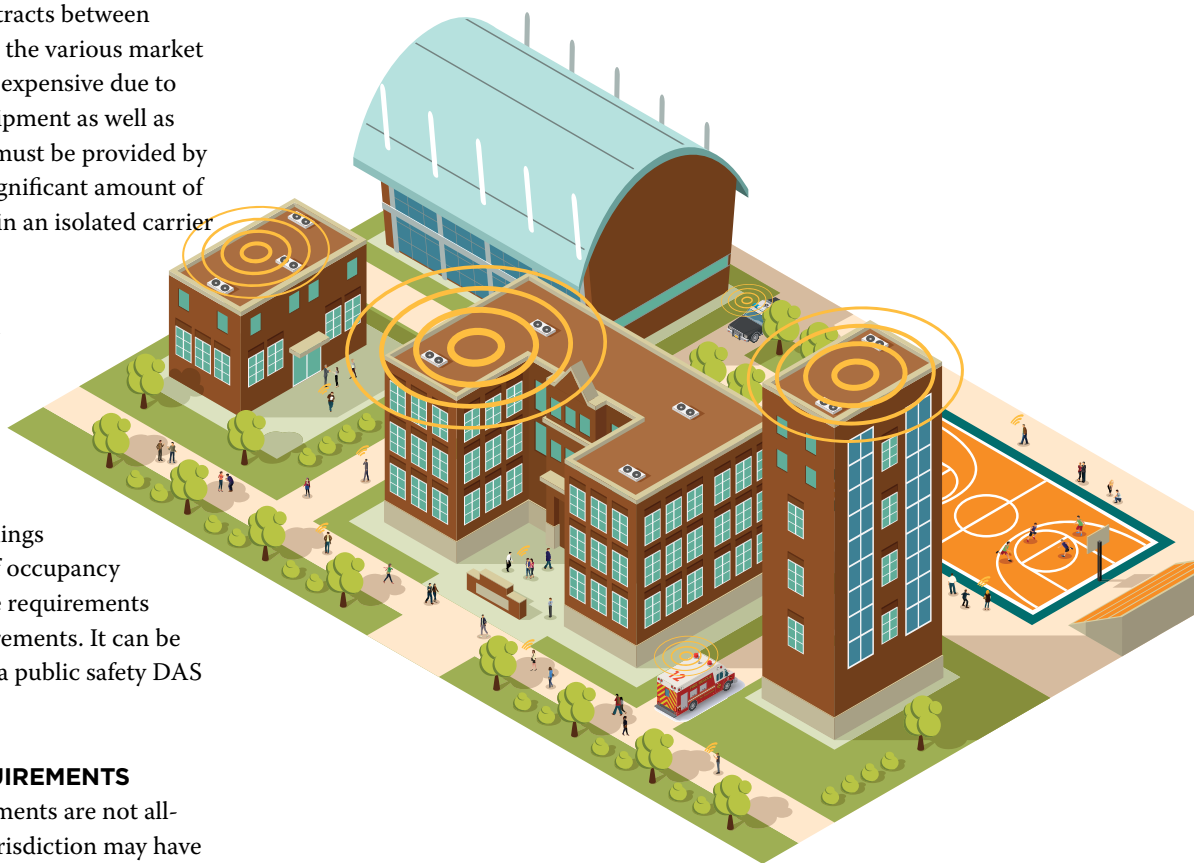
FM staff should at a minimum be conversational in these three different systems and understand what is currently deployed in their existing facilities or planned for new projects. Occasionally buildings do not receive their certificate of occupancy because first responder coverage requirements were not met per the AHJ requirements. It can be costly to retrofit a building with a public safety DAS near the project completion.

HIGHLIGHTS OF NFPA REQUIREMENTS

Please note that these requirements are not all-encompassing, and your local jurisdiction may have additional requirements or different guidance on these requirements.

- Critical areas of a building such as the fire command center(s), the fire pump room(s), exit stairs and passageways, elevator lobbies, standpipe cabinets, sprinkler sectional valve locations, and other areas deemed critical by the AHJ, shall be provided with 99 percent floor area radio coverage with a signal strength of −95 dBm.
- General building areas shall be provided with 90 percent floor area radio coverage with a signal strength of −95 dBm.
- If the requirements above cannot be met, a public safety DAS shall be designed and installed to provide the required coverage.
- All repeater, transmitter, receiver, signal booster components, and battery system components shall be contained in a NEMA Type 4 enclosure.
- All systems shall be powered by a secondary power supply capable of operation for at least 24 hours.
- Cabling between the public safety DAS equipment shall meet a two-hour fire rating along with the room that contains the equipment. Note that some jurisdictions require all riser cabling and sometimes all horizontal cabling to be two-

hour fire rated as well. This will add significant installation cost to a project.

- All public safety DAS must be inspected on an annual basis or when there is a renovation that changes the original field performance testing. Some AHJs require recertification every five years, but some are beginning to require recertification on an annual basis regardless of any renovations completed, to ensure the system is functioning properly. FM and owners need to be aware of this potential reoccurring requirement.

Most AHJs do not allow any other systems (cellular, customer-owned radio) on the public safety DAS. This ensures there are no interfering signal sources on the public safety system in the case of an emergency. If cellular reinforcement is required, a separate DAS is necessary.

When DAS comes up on your next project or renovation, be certain that everyone is utilizing the same terminology and on the same page about which type of DAS is being discussed and if it is in support of public safety/first responder radio or cellular service. Also make sure that your designers are considering the appropriate amount of infrastructure and pathway requirements between the rooms housing the DAS equipment, the roof, antennae, uninterruptible power system (UPS) location(s), and repeater antennae throughout the building.

To make matters even more challenging, the higher radio frequencies of the new 5G cell service will have even less building penetration. Previously installed cellular DAS systems may or may not be easily upgraded to support 5G. Stay tuned for a future Technology & Trends column on 5G (as well as Wi-Fi 6, IoT, IBT, and other confusing terms) and its impact on your campus, building, and occupants. ⑨

David Glenn is senior systems designer at the Sextant Group/NV5 Engineering & Technology in Washington, DC. He can be reached at *dglenn@thesextantgroup. com.* This is his first article for *Facilities Manager.*

Congratulations Class of September 2019

By Corey Newman

APPA's September 2019 CLS (Continuous Learning Series) class recently concluded in Nashville, Tennessee, showcasing another successful professional development gathering of the Institute for Facilities Management and Leadership Academy. Colleagues from around the globe were welcomed to learn, network, and collaborate.

We are grateful for the dedicated faculty who make these offerings such a success. A special note of thanks goes to Institute Deans **Mary Vosevich**, **Chris Smeds**, **Lynne Finn**, and **Don Guckert**; and to our Academy Faculty **Glenn Smith**, **Beth Clark**, **Shawna Code**, **Ana Thiemer**, **Viron Lynch**, and **Matt Adams**.

We also offered ASHRAE's HVAC Design: Level I – Essentials: Tools for High Performance Building Designers" and APPA's "Leading Your Facilities Organization through an Age of Transformational Change."

Throughout the week, students had opportunities to interact with experts who brought their knowledge and experiences from wide-ranging backgrounds and provided a rich environment for all attendees. Approximately 500 facilities professionals attended. As the week drew to a close, we celebrated with graduation ceremonies for the class of September 2019 (including 66 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, organizational, and institutional goals. Please visit *www.appa.org* and click on Continuous Learning for more on APPA's program offerings. 🦜

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

Academy Graduates

Photos by Rhonda Hole

ACADEMY GRADUATES

In alphabetical order; not all graduates are pictured

Randy Coleman, *Whitman College*

Richard Covington, *University of Virginia*

Michael Coyne, *University of Pennsylvania Philadelphia*

Gabriel Dreiling, *Oklahoma State University*

Ramiro Flores, *Texas Christian University*

John Furry, *Purdue University Main Campus*

Laura Gay, *Middle Georgia State University*

Joseph Harrell, *University of Cincinnati Main Campus*

Cathy Headley, *Grand Valley State University*

Deborah Johnson, *Purdue University Main Campus*

Robert Kelly, *University of Nebraska - Lincoln*

Brenda Korinek, *North Dakota State College of Science*

Melinda Lamoureux, *Bridgewater State University*

Lauren Lantz, *University of Cincinnati Main Campus*

Lee McQueen, *University of Nebraska - Kearney*

Will Meeker, *Kutztown University of Pennsylvania*

Barbara Morck, *University of New Mexico*

Ken Pearce, *University of North Carolina at Greensboro*

Vincent Price, *Dallas County Community College District Office*

Dave Reinhardt, *University of Nebraska - Lincoln*

Daniel Ridgway, *Kent State University*

Paul Sheff, *Wake Forest University*

Brian Stanford, *Virginia Polytechnic Institute and State University*

Anthony Stewart, *University of Maryland College Park*

Christopher Swank, *Grand Valley State University*

Scot Wilson, *Arizona State University*

Caroline Wolf, *Joliet Junior College*

Bernard Zertuche, *Alamo Colleges*

INSTITUTE GRADUATES

In alphabetical order; not all graduates are pictured

George Adams, *University of New Mexico*

Colin Atkinson, *Maquette University*

Mindy Baylor, *University of South Dakota*

James Harrison Blackwell, *University of Kentucky*

Chad Brandt, *University of Arizona*

Thomas Edward Couch, *Joint Task Force Civil Support*

Patricia Ann Counce, *Dallas County Community College District*

Tony DeJohn, *US Marine/Corps Camp Pendleton*

David DeLuca, *Quinnipiac University*

Tom Dietrich, *Baldwin Wallace University*

Patrick Dolan, *University of Pennsylvania Philadelphia*

Paul Duprey, *University of Virginia*

Steven Dussart, *University of New Mexico*

Ron English, *Indiana University Bloomington*

Doug Hagman, *Pennsylvania State University*

Robert Hartwright, *University of Massachusetts*

Andrew Henry, *University of Akron*

Lindsey Honeyager, *University of Wisconsin-Madison*

Steven Hughes, *University of Kentucky*

Edwin Jeffres, *University of Tennessee Health Science Center*

Steven Lemay, *University of Massachusetts*

Joe McKenna, *Purdue University - Fort Wayne*

Steven Mendoza, *Pima Community College*

Gary Morog, *State University of New York at Brockport*

Jason Murphy, *Univesrity of Kentucky*

Glosenda P. Navales, *University of Maryland Baltimore*

Tina Reese, *Western University of Health Science*

Gary Riggs, *University of California-Santa Cruz*

Armando Rios, *Texas Christian University*

Jackie Lynn Robledo, *University of Illinois at Urbana-Champaign*

Chad Royer, *Moravian College*

Kimberley A Sandoval, *University of Southern California*

Jeff Siebler, *University of Arkansas*

Dominic Silvers, *Bucknell University*

Stephanie Skebeck, *Pennsylvania State University*

Tad Smith, *Purdue University - Fort Wayne*

Jeffrey Surine, *Cornell University*

Dawn Syhre, *South Dakota State University*

Vincent Taylor, *North Carolina State University*

Gary L. Vargas, *Santa Clara University*

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

This column previously looked at one book that considered the advantages of serendipity over technical analysis. However, while chance is nice, it may not provide reliable results—which are what we need in facilities management. So this month we look at two books that discuss ways to see through the fog and identify better decision processes.

THINKING, FAST AND SLOW

Daniel Kahneman, Farrar, Straus and Giroux, New York, 2011, 418 pp., hardcover ($18), softcover ($11), ebook ($9.99), and audiobook ($41).

When provided with a set of symptoms or data, is the answer obvious? Not always. There is the knee-jerk reaction to difficult news, but there could also be a more thoughtful response that proves a much more effective and long-lasting solution. These are the issues discussed in *Thinking, Fast and Slow*.

Kahneman is not a facilities officer, architect, or engineer. He's a psychologist who has looked at how people respond to different situations. In *Thinking, Fast and Slow*, he describes the situations and physiology associated with fast thinking—almost a reflex—and slow thinking, for which one must stop and consider factors or process data into information. For instance, when presented with a problem, is it something you can answer while walking or running, or must you stop and dissect the problem before determining the answer? The first example is what Kahneman considers fast thinking, while the second requires slow thinking.

There are many other examples throughout the book, but they are generally directed toward psychology or economics rather than facilities. So where are the applications for facilities? Consider a call into the work control desk at your institution. The caller reports a problem as he or she sees it, and the person at the work desk reports the caller's request accurately—but in most cases the information is either wrong or misleading. Fast thinking results in a person being quickly dispatched to try to address the problem; slow thinking requires the receptionist to ask more questions, attempting to determine the appropri-ate shop or trade that might be involved in the right solution.

When fast thinking is used, the resolution of the request may require multiple visits to resolve the issue and take much longer than the slow-thinking approach. We take this approach all the time, because we recognize the value of getting better information. More significant applications of slow thinking may include choosing a contractor for an important campus project, or if you are a contractor, developing the price of a project by weighing many factors viewed as unrelated to the project. The slow-thinking approach may be the difference between a profitable project or a money loser.

While this is not a standard facility bookshelf book, it will increase your awareness of problems and the solutions necessary to achieve respect or successful budget management. I will be using the book to teach a course on critical thinking; it helps explain to engineering students why they need to consider issues that are not apparent in the problem.
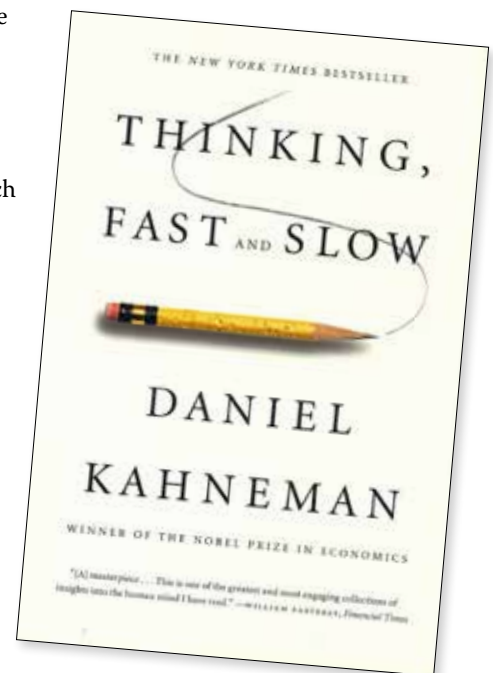
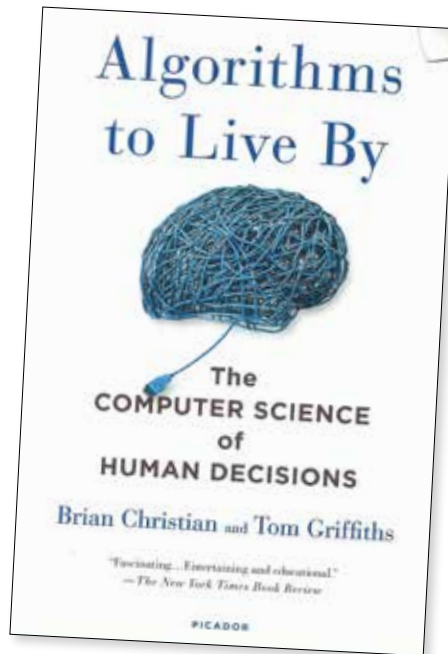## ALGORITHMS TO LIVE BY: THE COMPUTER SCIENCE OF HUMAN DECISIONS

Brian Christian and Tom Griffiths, Picador, New York, 2016, 262 pp., hardcover ($28).

We hear about algorithms more and more frequently as we utilize search engines and other apps that attempt to find artificial intelligence solutions for our daily needs. There's a great deal of confusion in the popular press about algorithms that is explained and dispelled frequently in *Algorithms to Live By*.

There are simple algorithms we apply daily, and more complicated algorithms that computer programmers may develop. So many of the algorithms we use every day are not even viewed as a mechanical or analytical process; we've grown accustomed to them. But use them we do.

There are many processes we use to improve our organization of problems and solutions. Either through sorting or arranging items, scheduling or managing time, projecting outcomes or interpolating data, or choosing data for solutions versus ignoring data; we take advantage of algorithms to address all problems, from easy addition of a few figures to complex management of millions of data points.

In *Algorithms to Live By*, Christian and Griffiths provide background to the algorithms we use constantly. These algorithms aren't mysterious, although there may be some analytical tools that we may not recognize as algorithms. For example, algorithms are used to make decisions about whether it is cheaper to replace a pump or keep repairing it; after listening to another episode of *Car Talk* on NPR, I'm reminded that Tom and Ray used algorithms to answer car problems for over 20 years (they are in reruns following Tom's death several years ago). But we still listen to them because they were entertaining and right! Some of us picked up their algorithms while listening.

If you're interested in understanding many of the systems and processes governing why we do things the way we do, consider *Algorithms to Live By*. It will make a nice gift for a curious friend or family member who wants to know more. 🕮

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

EARTHSAFE introduces a multipurpose cleaner and disinfectant to bridge the gap in infection prevention. EvaClean Infection Prevention System leverages advanced electrostatic sprayer technologies to cover three times the area in 80 percent less time, a "drop and go" sanitizing/disinfection chemistry, and simplified, scalable processes for higher-level compliance and maximum output. Nevertheless, a critical gap has remained in daily cleaning and floor disinfection strategies. Enter PUR:ONE—A one-step cleaning and disinfection solution for high-touch surfaces and floors, and the new front-end component of the all-encompassing EvaClean System. But, PUR:ONE does much more than fill a necessary gap in environmental hygiene. It's the first single-step cleaner and disinfectant to receive EPA registration as effective against bacteria in biofilm, and is on the K-list of approved products for use in cases of *Candida auris*, plus other emerging pathogen threats. For additional detailed information on EarthSafe visit *www.earthsafeca.com.*

SIEMENS DIGITAL INDUSTRIES has developed its suite of SmartMonitoring Apps, including Water Monitoring (WatMon) and Tank Monitoring (TankMon). WatMon is geared toward water and wastewater markets, and TankMon was designed
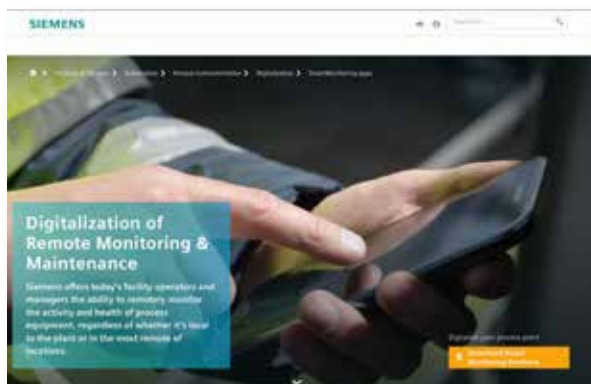
with industrial markets in mind. Both phone/tablet/pc apps allow the user to monitor the measurements and health of field instrumentation without requiring the user to be at the instrumentation installation site. With a virtually unlimited number of inputs, these apps allow quick, secure access to customers critical measurements and equipment information. By utilizing Siemens' flow, level, pressure, temperature, and weight measurement instrumentation as well as valve-control capabilities, Siemens can provide a broad range of process measurements and offer unequaled monitoring of the health and performance of those products. For more information about Siemens Digital Industries, visit *www.usa.siemens.com/monitoring-apps.*

CINTAS CORPORATION is reminding people of its free mobile restroom-finder app, "Got to Go," which allows users to find restrooms in their vicinity and rate them based on cleanliness.

With the "Got to Go" app, users have two options: Number One—locate a nearby public restroom. App users will be shown a map with nearby restrooms differentiated by three colors: Top-rated, clean restrooms are indicated with a green icon; low-rated, dirty restrooms are indicated with a yellow icon; and unrated restrooms are indicted by a blue icon. Users can also view restrooms in "list view," allowing them to see nearby restrooms sorted by distance. Number Two—Rate the condition of a public restroom. Users can rate the condition of the restroom (dirty or clean), supply level (low or well-stocked), smell (good or bad), and whether it's open to the public or available to customers only. For more information go to Cintas Corporation online at *www.cintas.com/gottogo.*

THE ENERGY CONSERVATORY announces the new capability for its digital gauge. Home-performance professionals now have an easier way to connect their DG-1000 Pressure and Flow Gauge to a mobile device—

Bluetooth. The DG-1000 is the first air-flow and pressure gauge on the market to feature Bluetooth. By taking advantage of this wireless technology instead of the gauge's standard WiFi, users have full access to all features of their devices, such as apps and email. The connection range is similar to WiFi, so professionals can move freely around the building they're testing. For more information on The Energy Conservatory visit *www. energyconservatory.com*.

OVERHEAD DOOR BRAND has launched RapidFreeze 997—

an interior fabric high-speed freezer and cooler door that features an insulated curtain along with other cutting-edge engineering design elements, providing a thermal barrier to prevent conductive or convective cooling loss across the door. RapidFreeze 997 joins Overhead Door Brand's lineup of Interior High Speed Fabric Doors, filling the market's need for a door built on application-based configurations proven to help address various temperature-dependent site problems before they can occur. As a complement to the durability of the system, this door is equipped for tough operation with curtain breakaway in both directions, complemented with electronic reset. With an opening speed of up to 80 in./sec., the RapidFreeze 997 is built for fast, high-cycle operation thanks to its specialized design that supports minimal interruptions for maintenance

as well as minimized wear and tear, and its variable frequency that eliminates sudden jolts from door start and stop. For more information, please visit Overhead Door at *overheaddoor.com*.

JOHNSON CONTROLS-HITACHI AIR CONDITIONING introduces the Hitachi Water Source Variable Refrigerant Flow (VRF) heat pump and heat recovery systems. The new multimodule systems offer the capability of connecting multiple single-module units, ranging from 6-48 tons. In addition to the benefits of VRF technology, these new compact systems deliver reduced first costs, compact size that enhances exterior appearance while eliminating outdoor noise, and design flexibility through a variety of configurations. The systems are ideal for projects with limited space such as high-rise buildings, office buildings, architecturally restricted properties, and apartments. Additional information about Johnson Controls-Hitachi Air Conditioning can be found at *www.johnsoncontrols.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, email Gerry Van Treeck at *gvtgvt@earthlink.net*.

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