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JUL/AUG 2020

# FACILITIES manager

## *Disruption and Campus Facilities*



Disruptive Technologies  
COVID & Water Stagnation  
Potty Parity in Performing Arts

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# features



## DISRUPTION AND CAMPUS FACILITIES

### 14 Deploying Disruptive Technologies with a Disruptive Approach to Leadership

*By Adam Lawver and Sean O'Connor*

Apple. Disney. Lego. What these companies all have in common is that they have “disrupted” their traditional business models and (some would argue) their respective industries by introducing game-changing technologies. They are preparing for the future, or in Simon Sinek’s words “playing the infinite game.”



### 24 Water Stagnation and Reopening Our Campuses After COVID-19

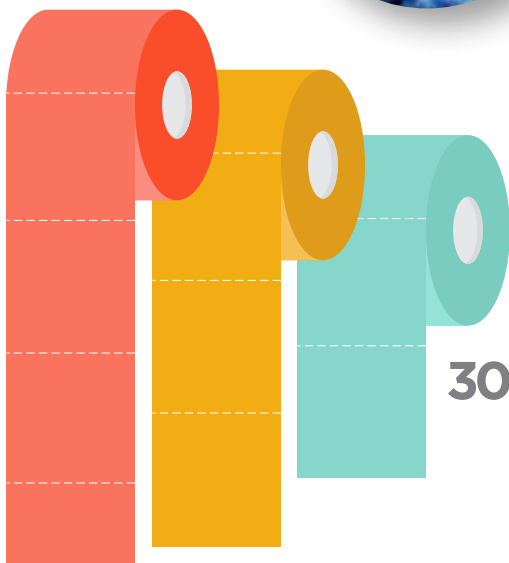
*By Tim Keane and William Rhoads, Ph.D.*

While academic institutions experience widespread stagnation annually during summer months, it is suspected that COVID-related stagnation is more extensive and longer duration than normal. While there is no simple one size fits all answer, many building managers have to make decisions about their particular facility and risk factors, and what level of response is appropriate and achievable.

### 30 Potty Parity in Performing Arts

*By Rose Steele*

Pre-pandemic, there weren’t enough women’s stalls in public bathrooms in performing arts facilities because building codes do not require enough to accommodate the actual demands. And, despite improvements on this front over the last 30 years, codes have continued to ignore this key issue. Switching to gender-neutral bathrooms could greatly reduce the problem, or at least spread it equally among all patrons and those of us in design and construction.



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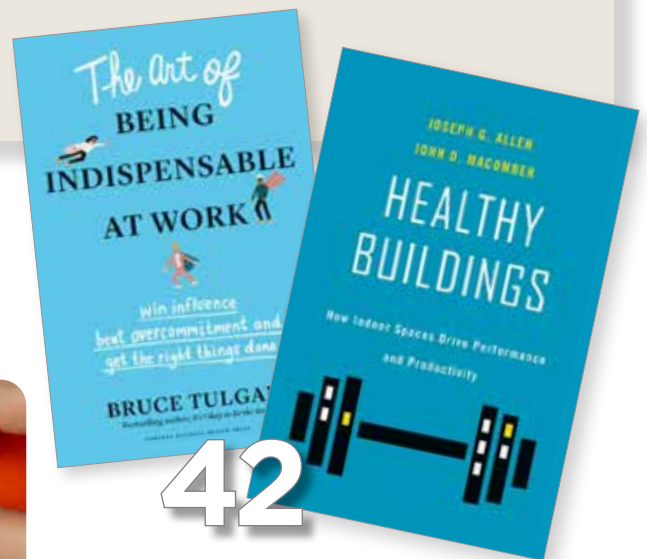
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# Overcome school security challenges with network solutions.

As Washington Community High School (WCHS) grew, its security needs also expanded. After a security audit, it found that its outdated, cobbled-together analog cameras had a number of drawbacks. The system produced poor image quality and false alarms, was difficult to use, and it didn't allow operators to efficiently retrieve video. WCHS opted to replace the system with a complete end-to-end network solution, resulting in improved quality, coverage, ease of use and enhanced security.

**Learn more about how WCHS overhauled its security system with our network solutions: [www.axis-communications.com/il/washington](http://www.axis-communications.com/il/washington)**

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## Cowperthwaite & D'Angelo Receive 2020 Rex Dillow Award

### APPA is happy to announce that

the 2020 recipients of the Rex Dillow Award for Outstanding Article are the



Brian Cowperthwaite



John D'Angelo

University of Chicago's Brian Cowperthwaite and John D'Angelo. Their article, "Infrastructure Resiliency Model," was originally published in the September/October 2019 issue of *Facilities Manager*. APPA's Information and Communications Committee, led by Vice President David Handwork of Arkansas State University, made its selection from the nine eligible articles published in the six issues of *Facilities Manager* within the past year.

Since 1987, APPA has presented the annual Rex Dillow for Outstanding Article in *Facilities Manager* to the feature article deemed most relevant, readable, and valuable from the previous year's eligible articles. Cowperthwaite is director of facilities operations and maintenance, and D'Angelo is assistant vice president, facilities services, at the University of Chicago. They received their award virtually during the 2020 Awards Celebration held during APPA's Virtual Facilities Summit.

An excerpt follows: *Using the Infrastructure Resiliency Model (IRM) allows the facilities team to specifically apply the data already developed for its deferred-maintenance or FCI benchmark within a framework that addresses probability and severity of risk while allowing for real-world drivers, constraints, and restraints. IRM also integrates operating account maintenance with recapitalization projects within the same framework.* To read the entire article, visit <https://www1.appa.org/FacilitiesManager/article.cfm?ItemNumber=4332&parentid=2737>.

Congratulations to Brian and John on receiving the 2020 Rex Dillow Award. If you have an article, case

study, emerging practice, or ideas to share with fellow APPA members and readers of *Facilities Manager*, please contact me directly at [steve@appa.org](mailto:steve@appa.org). I welcome your contributions.

### PREPARING FOR THE STUDENT OF 2024 IS THE FOCUS OF 2020 THOUGHT LEADERS REPORT


APPA has just published the 2020 Thought Leaders report, entitled *Preparing for the Student of 2024*.

The report is available at no cost to APPA members through the APPA Bookstore <link to <https://www.appa.org/bookstore>>, and is \$99 for nonmembers.



Contents of the new TLS report include:

- Executive Summary – diverse, focused, and tech-savvy students
- Traditional and Nontraditional Students of 2024 – influences and characteristics, expectations post-COVID and on racial inequalities
- Implications for Higher Education – increased collaboration, expanded student life and mental health services, defined value proposition, strategic reinvestment in facilities
- Questions for Campus Discussion

Many thanks to Thought Leaders sponsors Jacobs and Johnson Controls Inc. for their continued support and helping APPA provide the valuable Thought Leaders reports to APPA members at no charge. Learn more about the Thought Leaders Series at <https://www.appa.org/thought-leaders-series/>. 

### COMING IN SEP/OCT 2020

- Profile of President Jim Jackson
- COVID's Effects on the Facilities Workplace
- APPA 2020 Virtual Facilities Summit Highlights

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### About APPA

**APPA cultivates community and contribution that drive results.**

APPA promotes leadership in educational facilities for professionals seeking to build their careers, transform their institutions, and elevate the value and recognition of facilities in education. Founded in 1914, APPA – formerly the Association of Physical Plant Administrators – is the association of choice for educational facilities professionals at learning institutions throughout the United States, Canada, and abroad. For more information, visit us at [www.appa.org](http://www.appa.org).

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# facilities digest

By Anita Dosik

industry news & events

## APPA 2020 AWARD WINNERS

### 2020 EFFECTIVE & INNOVATIVE AWARD

Oklahoma State University  
Purdue University  
University of Massachusetts Lowell  
University of Nebraska Kearney  
University of Virginia

### 2020 SUSTAINABILITY AWARD

Auburn University  
Brown University  
Louisiana State University  
Pennsylvania State University  
University of North Dakota

### 2020 MERITORIOUS AWARD

Michelle Frederick (ERAPPA)  
Peter Strazdas (MAPPA)  
Daniel Wooten (SRAPPA)

### 2020 PACESETTER AWARD

Nicole Sanderson (PCAPPA)

### 2020 REX DILLOW AWARD FOR OUTSTANDING ARTICLE

Brian Cowperthwaite and John D'Angelo

### 2020 DOUGLAS K. CHRISTENSEN DISTINGUISHED LEADERSHIP & ETHICS AWARD

William A. Daigneau, APPA Fellow

## 2020 APPLICATIONS DUE NOVEMBER 30 at 11:59 PM ET

Nominations and applications are now being taken for APPA's 2020 institutional and individual awards:

- Award for Excellence
- Sustainability Award
- Effective and Innovative Practices Award
- APPA Fellow
- Meritorious Service Award
- Pacesetter Award

Award nominations submitted after November 30, 2020 will be held and considered in the 2021 award cycle. To find out details about Individual awards, visit <https://www.appa.org/appa-individual-awards/> and for Institutional Awards, visit <https://www.appa.org/award-for-excellence/>. To submit, log into your myAPPA account and select myAwards. If you have questions, please contact Kristin Witters at [kristin@appa.org](mailto:kristin@appa.org) and Holly Judd at [holly@appa.org](mailto:holly@appa.org).

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Show the world you are part of the educational facilities world's top professional organization. At the APPA Lands' End store, you can purchase high-quality apparel and other gear of your choice and have it personalized with the APPA logo. All personalized products are backed 100 percent by the Lands' End product guarantee.

Visit <https://business.landsend.com/store/appa> today to fulfill your APPA gear needs—and those of your staff—at the APPA Lands' End store.





## APPA's Webinar Series

APPA's free monthly webinar series keeps its members informed and connected in the world of facilities. APPA began offering the 1-hour webinars in the summer of 2017, and has grown to 15,000 attendees. Additionally, our series of Town Halls around the COVID-19 pandemic have been widely popular and helpful to our members and the facilities community at large in handling this crisis.

APPA also issues continuing education certificates to attendees from these webinars (7,000 to date!) and is an AIA Continuing Learning Units (CLUs) provider for AIA credentialing programs when appropriate.

APPA offers the following continuing education credits for these webinars:

- .1 CEU
- 1 PDH
- 1 LU
- 1 APPA Credential Unit

If you have questions regarding certificates, or past and upcoming webinar sessions, please contact Billie Zidek, standards & codes administrator, at [billie@appa.org](mailto:billie@appa.org).

## UPCOMING WEBINARS AND TOWN HALLS

### JULY

- 30** – Why Rapid Access Programs Are More Important Than Ever in Campus Settings

### AUGUST

- 6** – The Future Isn't What It Used to Be: Occupied Space in the COVID-19 Era
- 13** – Koffel Talk – NFPA 13 and NFPA 25
- 20** – NFPA 3000: Risk Assessment & Site
- 21** – COVID-19 Town Hall (Subject TBA)
- 27** – Koffel Talk – NFPA 101 (\*)

### SEPTEMBER

- 17** – Changes to ICC 2021 and NFPA Codes

### OCTOBER

- 1** – Optimizing the Value of Your Computerized Maintenance Management Software (CMMS)
- 8** – Cybersecurity Challenges Addressed in NFPA 72 (*Registration Coming Soon*)
- 15** – Explosion at University of Maryland (*Registration Coming Soon*)
- 22** – Making BIM Work For You

Visit <https://www.appa.org/webinars/> to get details and register for any of these upcoming events!

## APPA Events

**AUG 04, 2020**

**APPA 2020 Virtual Facilities Summit – Live Keynote by Boston Marathoner Dr. Natalie Stavas**

**AUG 05, 2020**

**APPA 2020 Virtual Facilities Summit – Live Keynote by Author/Educator Stedman Graham**

**AUG 06, 2020**

**Webinar: The Future Isn't what it used to be: Occupied Space in the COVID-19 Era**

**AUG 13, 2020**

**Webinar: Koffel Talk – What You Need to Know About NFPA 13 and NFPA 25**

**AUG 19, 2020**

**APPA Summer Series – Creating a Culture of Respect and Dignity**

**AUG 20, 2020**

**Webinar: NFPA 3000: Risk Assessment and Site Survey Key Points**

**AUG 25, 2020**

**APPA Summer Series – FPI 2.0: A New Spin on Your Data**

**AUG 27, 2020**

**Webinar: Koffel Talk – NFPA 101 – Life Safety Code®**

For more events and programs, visit [www.appa.org/events](http://www.appa.org/events).

# The Importance of Listening

By Salvador Rodriguez and Tom Polansky

**T**his month's Membership Matters columns features an interview with Salvador Rodriguez conducted by Tom Polansky. Salvador shares his APPA story and management style evolution, taking us through the ways that he, his employees, and his department have changed and grown over time.

**Tom Polansky:** *What was the state of your department when you started your current position?*

**Salvador Rodriguez:** I arrived at San Joaquin Delta Community College District (SJDC) in 2006. At that time, the facilities department had just completed a reorganization where they consolidated the vacant custodial and grounds supervisor positions into one management position and title, which I hold today. During that time, the employees performed the best job they could with little to no management or oversight. There was no leadership, vision, or accountability, and I must admit they did a pretty good job. I had no office, no computer, no files, and a pencil and pad of paper. As a first-time manager, I had my work cut out for me.

**TP:** *At the time, what did you think your biggest problem was?*

**SR:** There were several ongoing issues, but at the time, I felt the biggest problem was that the employees were not following directions or communicating. I felt confident as a subject expert in both the custodial and landscaping trades. I owned and operated a computer repair business, so I felt confident in my management style.

Blessed with the opportunity to work at my first management position at the college, I suddenly found myself as a small fish in a big pond. Eager to learn the correct way of managing personnel, I was disappointed to find out there was no mentoring program for new managers such as myself, and no

professional organizations I could utilize. The only suggestion from the marginal director was that if I was not writing employees up, then I was failing as a manager and not doing my job. As a former CSEA (Civil Service Employees Association) union activist and member intern, I knew a lot of these write-ups would not hold up in the grievances process, and indeed, I lost most of them. Nevertheless, eventually I got their attention, and, in time, realized that in order to improve my winning percentage, I needed to draw an objective conclusion to measure performance. I soon discovered APPA, the panacea for all of my problems!

**TP:** *How did your conversations with PCAPPA (Pacific Coast APPA) folks help? What things did you learn?*

**SR:** Bound by years of marginal directors who could care less about my desire for the leadership training I had been begging for, I was finally allowed to attend the APPA/PCAPPA/BAYAPPA joint conference 2017 in San Francisco. Elated with this opportunity, I was a first-timer and recognized with distinction. I was awestruck by listening to members describe the successes they had been having at their organizations. Searching for answers and finding solutions within the APPA training courses offered was not enough. I also learned about APPA's credentialing program, vendor partnerships, and drive-in workshops. Mostly, I wanted to become an effective leader and not just a titleholder.

At the conference, I decided to become involved in the organization and stopped by the Small and Community Colleges Committee (SCCC) booth, where I met up with Thomas Polansky. Tom provided me with several resources, such as the APPA mentoring program and APPA's Supervisor's Toolkit training. I found that I mostly learned by listening to other





professionals during our monthly SCCC calls. My APPA mentor was Robert Andrews, and he was a tremendous help. I soon discovered the importance of holding one-on-one meetings with each of my employees.

**TP:** *How did you first start the culture change in your department?*

**SR:** I became committed to changing after attending the joint conference in 2017. I went back to work excited, filled with hope and direction. Those beautiful feelings were immediately diminished by the attitude of the director; for whatever reason, I was not to attend any more conferences or training, nor could I implement any of APPA's workloading. I became more vocal as I spoke out about this oppressive behavior and demanded change, and there was willingness for me to resign. Suddenly, both of the supervisors left the organization, and I seized the opportunity to grow and change the culture. I read up on Stephen Covey's *The 7 Habits of Highly Effective People* and attended the Supervisor's Toolkit. I reached out to Toney Lawson, CSEA's job steward for my area, and shared my vision of inclusivity, open communication, empathy, and sharing of grace. He embraced the change but with guarded optimism. Over time, I have demonstrated my desire for change, not with speeches or with PowerPoints, but with real action.

**TP:** *How did your definition of the problems change over time?*

**SR:** It only changed when I educated myself and took a hard look at myself, my actions, and mostly my words. Suddenly, I realized that it was not the employees' fault for producing mediocre results, because they were only reacting to the culture that the institution and I had created. I cannot control the actions of others, but I can control my reactions and try to communicate effectively. I had to change my perspective; you could call it a paradigm shift in thinking and reframing my perception of reality. For the most part, I do not believe employees are the problem; however, that's not to say that I do not have marginal employees who require a lot more energy.

**TP:** *How did you get the staff to "see the light"?*

**SR:** I started to communicate, communicate, communicate, and to use active listening skills. Today, before I move forward with any changes in procedures, I express my intent to the union leaders, to my department leadership team, and then to the newly formed Custodial Success Group. During this

process, I field any questions they may have, and take any concerns or ideas they have into consideration. Then when we meet as a department, a decision is made based upon modified consensus. This allows everyone to have a voice that will be seriously considered at multiple levels.

Furthermore, I no longer live or die by an arbitrary decision that I've made. Instead, I allow for flexibility. When seeking consensus, I ask the team how this decision affects the experience of students, employees, and managers at the college. A decision is made based upon improving the experience in all three paradigms.

**TP:** *Did you need to give up some control to bring the staff into the solution?*

**SR:** I don't believe that I gave up control since I didn't have it to begin with. Achieving positive results through people is what makes a good supervisor. It is my responsibility to make sure that I am understood. As much as we managers believe, we simply cannot control people and their actions—it stifles critical thinking skills and creativity. I found that what works is to increase open communication. But what does that look like? I can certainly talk up a process that I believe is achievable, but I must have the crew's buy-in for success.

For us to achieve our goals, I believe in Covey's approach of seeking first to understand and then to be understood. I also gained many tools from APPA's Supervisor's Toolkit, especially when it came to communication. I realized that I need to take time to actively listen and ask questions of staff. Assumptions are a huge part of the problem, and for good reason. In our busy lives, assumptions are a communication shortcut, because to communicate effectively is time-consuming.

**TP:** *What was your biggest surprise in this whole process?*

**SR:** That I am the problem. I feel strongly that change management rests with me and my ability to listen first and then speak—your words are powerful and meaningful. This process is complicated because I have had the wrong image (or map) of what managing people and personalities in a culturally diverse community college is about.

Also, that I changed my perspective. My subordinates don't work for me now; I work for them. I am responsible for providing them with the tools to work effectively and efficiently. Their happiness at work does increase productivity. I work every day to

ensure that I use power phrases when speaking. The relationship that I have with the critics and marginal employees has changed from adversarial to, at best, a willingness to understand. The performance coaching and two-minute challenge from the Supervisor's Toolkit have helped me focus on performance and not personalities.

However, I have had setbacks. Recently, twice in one week, my coaching on "how to communicate" turned into an embarrassing situation for myself and the same employee! I was arrogant and felt my communication style was best. Instead, I needed to step back and recognize the pattern of communication this person has, and just shut up, listen, and then ask questions. I fear that as these setbacks start piling up, it will negatively impact employees' willingness to engage in open dialogue without retribution. So, to counteract this, I publicly apologized for my actions. Yes, I did! It was OK to say I'm sorry, because humility set me free from carrying those emotions of failure or blame.

**TP:** *What would you tell others in your same situation?*

**SR:** First, reach out to APPA leadership for assistance and direction. Look at yourself and determine your intention for any policy or process you intend to implement. Does it improve the student or customer experience? Share ideas not only with management but with the employees you work for, and ask for their feedback. Explain why this change is essential and what the intended results are. Set up small workgroups with constituents such as union and/or lead personnel. Employees want a say on subjects that affect their daily lives. For example, I trust the custodial leadership, and the Custodial Success Group (employees only) to help with some of the decision-making. Then, I have meetings with each employee about every six weeks. The meeting is not to point out failures, but to listen from their perspective about what project they feel proud to show me. This allows me to see it first-hand and to thank them for a good job. Areas that need improvement are framed in terms of what resources are necessary for success. Ask plenty of open-ended questions, and don't assume! Failing is an option because "fail" means First Attempt In Learning.

Finally, I ask employees how I am performing as their manager, then I ask myself, would I want to work for me? At first, all of this may seem like a lot of work, and it is, but time is a tool, so use it to fix critical issues and to foster real change. Ultimately your team will become more efficient, the meetings will get shorter, and the focus will change from problems to a shared vision of win-win. ☺

Tom Polansky is associate vice president at Occidental College, Los Angeles, CA, and can be reached at [tpolansky@oxy.edu](mailto:tpolansky@oxy.edu). Salvador Rodriguez is custodial services and grounds manager and APPA's Primary Representative for San Joaquin Delta College, Stockton, CA. He can be reached at [salvador.rodriguez@deltacollege.edu](mailto:salvador.rodriguez@deltacollege.edu). This is their first article for *Facilities Management*.

The graphic features a background image of hands pointing at architectural blueprints. Overlaid on this is a large, stylized logo for 'fm²' (Facilities Management squared) in a white rounded square. The text 'Operations Experts' is in the top left, and 'FACILITY MANAGEMENT METRICS' is written diagonally across the center in large, bold, black letters. At the bottom, a dark grey banner contains the text 'Workplace Culture • Best Practices', 'Productivity • Organizational Change', and the email 'info@fm2.biz'.

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# Immersive Technologies and Smart Buildings Reduce Costs and Create More Accessible, Innovative Learning Environments

By Emil Alon

**H**igher education facilities managers continue to stress that their biggest industry challenge is caused by aging facilities and the lack of financial resources to deal with them effectively. The impact of COVID-19 makes it even more critical for managers to reduce costs and increase efficiencies while ensuring that their facilities support the latest innovative learning experiences.

New technologies like augmented reality (AR) and artificial intelligence (AI) can help facilities managers automate processes and access data for greater efficiency.

Automating maintenance and repairs can rapidly increase maintenance productivity, provide a faster flow of information among technicians, and reduce the need for hiring more staff. Once smart maintenance is implemented, educational facilities are transformed into intelligent digital environments. This approach makes it easier to leverage additional AR applications that address more critical issues, such as managing equipment and devices, facilitating employee onboarding and training, and extending physical spaces by creating new digital real estate.

AI is also powering a new era of robotics in facilities management. With the right system of sensors and processors, robots are helping to automate activities such as cleaning and maintaining buildings, from windows and floors to HVAC ducts. They can help supplement human employees during tasks where safety may be a concern. Advanced AI enables robots to work alongside skilled human workers and even communicate with them in real time. This makes the jobs of a greater number of skilled workers easier and safer.

AI applications can also collect aggregate data analytics and deliver invaluable insights for making ongoing decisions to increase efficiencies,

optimize strategic planning, and inform regulatory compliance.

## SMART MAINTENANCE AND OPERATIONS

Facilities managers may choose to leverage smart maintenance and navigation applications. With this type of application, anyone in a building can point their mobile device at any object that needs repair. The object's precise location is automatically noted, and a repair ticket is created. Existing maintenance data and other relevant information can then be integrated before sending the ticket to the repair technician, along with AR navigation instructions.

Technicians may also receive easy access to relevant AR content, such as tutorials or instructions that furnish step-by-step information for addressing maintenance tasks. This type of application can greatly increase technician productivity, decrease hiring needs, and lower the cost of maintenance and repairs.

## IOT CONTROLS

As more and more Internet of Things (IoT) devices are used in buildings, there is also an explosion of services and applications for controlling each device. This increase in complexity can become unwieldy and create added maintenance costs. A mobile AI/AR application can offer an efficient way to address this problem—consider the advantage of having one app that automatically recognizes all smart devices in a building, including lights, thermostats, monitors, and many others. Such an app can identify a device, sensor, or piece of equipment, pull up the appropriate interface, and allow anyone to easily manage and control it.

## AR TRAINING AND TUTORIALS

Immersive AR training and tutorials offer much



more engaging, interactive experiences as compared to videos and manuals, making it easier to understand how to operate complex equipment. AR can provide the right training at the right time so content can be automatically accessible on a mobile device when technicians or staff navigate buildings. Once implemented, AR content can be managed and updated remotely—which not only helps keep content fresh and relevant but also lowers the cost of providing new content.


### CREATING THE LEARNING SPACES OF TOMORROW

Once a facility has been analyzed and converted into an intelligent digital environment, there are endless possibilities to leverage the AR cloud for new use cases that can transform today's outdated buildings into innovative learning spaces.

Facilities managers can leverage the same platform, giving staff the ability to create engaging AR content without having to provide them with new hardware or costly equipment. AR is increasingly

used for education across multiple subjects, to make lessons come to life, enhancing interactivity with the material, and enable students to practice more without the need to purchase new models or materials.

It's clear that COVID-19 is going to change our society in many ways, some of which may be more permanent than we think. Even as shelter-in-place orders are lifted, facilities will need to maintain some level of social distancing and provide much more information to end users in their buildings.

Particularly in education, AR can help facilities managers prepare for new realities. These technologies enable more intelligent digital environments that run with greater efficiency and offer the ability to reimagine educational spaces. 

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Emil Alon is the CEO and founder of Resonai, an augmented reality company based in Tel-Aviv, Israel. He can be reached via LinkedIn at <https://www.linkedin.com/in/emil-alon-06b6425/>. This is his first article for *Facilities Manager*.

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By Adam Lawver and Sean O'Connor

A decorative graphic featuring six white paper airplanes arranged in a circular pattern on a teal background. A dashed white line forms a circle around the airplanes, and a diagonal dashed white line crosses the circle from the bottom left to the top right.

# *Deploying Disruptive Technologies with a **Disruptive** Approach to Leadership*



Apple. Disney. Lego. These names are well known to us all. But the names of many other organizations could also be added to this list. What they all have in common is that they have “disrupted” their traditional business models and (some would argue) their respective industries by introducing game-changing technologies. They are preparing for the future or, in Simon Sinek’s words, “playing the infinite game.”



In this sense, “disruption” is not necessarily bad; it can include positive and unprecedented responses to unforeseen circumstances that threaten to undermine business-as-usual. The many articles written about the companies listed above make it clear that at the core of their respective responses has been a commitment to reinvigorate the corporate culture in a way that not only encourages innovation but also—and more importantly—*develops leaders who can foster a higher level of trust within the workforce.*

What often results from this disruptive approach to organizational leadership is a team of forward-thinking leaders capable of responding quickly, especially to unanticipated crises. The hope is that this new type of leadership can avoid the same mistakes that were made in the past, mistakes that today can be more far-reaching and devastating in our rapidly changing culture. In addition, such leadership teams should be flexible and adaptable, prepared for the next crisis that might disrupt the corporate routine yet again. One way or another, new technologies—such as automation, robotics, sensors, communication devices, and exoskeleton suits—will shape how we do what we do. The critical

develop a community of leaders at all levels—leaders capable of planning, of reacting quickly and flexibly, and of promoting operational excellence to match an accelerating pace of disruptive change.

#### THE CASE OF MICHIGAN STATE UNIVERSITY

Campus Services, a subunit of Infrastructure Planning and Facilities (IPF) at Michigan State University (MSU) responsible for maintaining the university’s facilities and grounds, has been aggressively deploying mobile devices, mobile robotics, sensors to monitor human behavior, and autonomous-vehicle and mobility-industry technologies to promote a high-performance workplace culture. These new technologies are disruptive in the sense that they are changing the way Campus Services operates, but they are doing so constructively. From this experience, we know firsthand that such rapidly evolving technologies can indeed increase both productivity and volume of business.

Our on-campus operation consists of 780 (full-time, temporary, on-call, and student) employees, 45 of whom serve in some formal leadership/supervisory role. This workforce is deployed



**“THE HIGHEST LEVELS OF PERFORMANCE REQUIRE THE DEEPEST LEVELS OF TRUST. AS YOU DEPLOY DISRUPTIVE TECHNOLOGIES, CHANGING THE GAME FOR HOW YOU DO WHAT YOU DO, THEN FOSTERING TRUST BECOMES JUST AS IMPORTANT—OR MORE IMPORTANT—THAN THE TECHNOLOGIES BEING DEPLOYED.”**

question now becomes how we, as organizational leaders, build levels of trust to foster a workplace climate that inspires and encourages a high-performance workforce flexible enough to respond effectively to unanticipated events.

What immediately comes to mind, of course, is the COVID-19 pandemic and the challenges it has presented (and will continue to present). It has disrupted almost every routine in both our professional and our personal lives, blurring (and sometimes dissolving) the conventional lines that separate the two. Uncertainty is on everyone’s mind, and much of life as we once knew it will never be the same. But this crisis also provides an opportunity to “reboot” and to accelerate important and necessary transformations. Organizational leaders who understand the importance of fostering trust within the workplace will be better equipped to “disrupt” their usual business models in the face of a crisis than leaders who do not.

This paper proposes that one of the keys to managing disruption is to invest in the organization’s *culture of work*, as well as in the technologies required for progressive change, in order to

in four labor-intensive business areas that help keep the MSU campus clean, sustainable, and safe: 1) Landscape Services, 2) Custodial Services, 3) the Surplus Store and Recycling Center, and 4) Transportation Services. It is critical to note that *70 percent of our business costs are labor expenses*; therefore, optimizing the efficiency and safety of these laborers is extremely important.

As we have navigated the disruptions caused by COVID-19, we have learned (sometimes by our mistakes) two related things:

**1. We must continue focusing on *HOW* to do what we have always done, but also more on *WHY* we do it in the first place.** If there is a good reason (*why*) for continuing to provide a given service, then *how* will we provide it as we move forward, given the rapid and unpredictable changes that are occurring around us? It should be obvious that such an important conversation must include not only our 45 supervisors but also *the entire workforce* deployed across campus at our various points-of-service, thereby creating a community of leaders.

2. We have had to encourage our team leaders to place more value on the workplace perspectives of those they supervise (i.e., those who follow their lead). We are gambling that we can better achieve operational excellence if we all work together across the ranks, helping one another—the entire workforce—to achieve a higher level of performance while coping with unanticipated challenges that are sure to arise and that always have the potential to dishearten, if not demoralize the workforce.

What the workplace needs in our disruptive age are leaders who first appreciate not only the workplace needs and desires of those they supervise, but also what these workers, in turn, expect of them and of the leadership and direction they provide. Perhaps the greatest resource an organization has is the invisible fabric of interwoven relationships between supervisors and laborers—a fabric of trust. How an organization creates, fosters, and rewards trust will directly impact the level of workplace performance.

## DEPLOYING DISRUPTIVE TECHNOLOGY

The following six sections describe or envision the deployment of six disruptive technologies related to MSU's Campus Services operations. Each section includes a brief description of the relevant business concept and a discussion of the new approach to leadership necessary for the successful utilization of that technology. We also discuss the challenges and opportunities that arise as the organization becomes increasingly competent in using that technology—in other words, as the technology matures from its initial (“experimental”) stage of application, to a more sophisticated stage of development, to a final stage where it is more completely integrated into the operations of the entire organization.

### 1. Handheld Mobile Devices

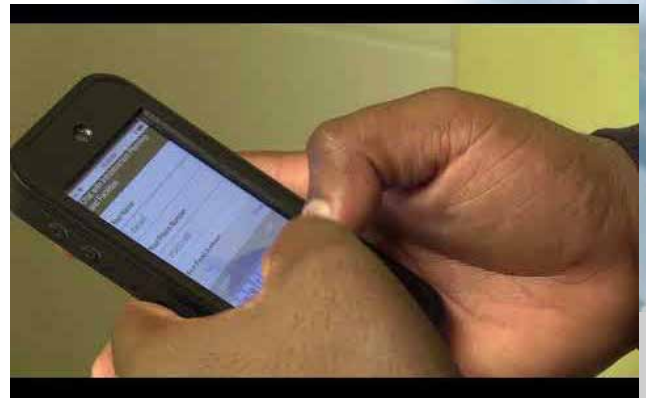
**Business Concept.** Today, and for the foreseeable future, the workforce must be equipped with access to information out in the field where critical decisions are made. It is therefore essential to provide mobile devices as a platform for improving access to that information. Technology systems can then be aligned to establish an “information ecosystem” not only to manage data gleaned in the field but also to track operational metrics and to plan future operational strategy.

**The MSU Story.** These links each provide a visual display of how handheld devices have radically improved the way Campus Services and IPF operates: (*See Displays 1 and 2*).

**Approach to Leadership.** The financial crises of 2008 resulted in a 10 percent reduction in the general fund of our Landscape Services department. It never fully recovered, and by 2012 many of our funding accounts were operating in the red, and a few customers were considering outsourcing our services. Levels of trust, morale, and optimism were at an all-time low. Leaders



Display 1 - Landscape Services using mobile devices in 2016.



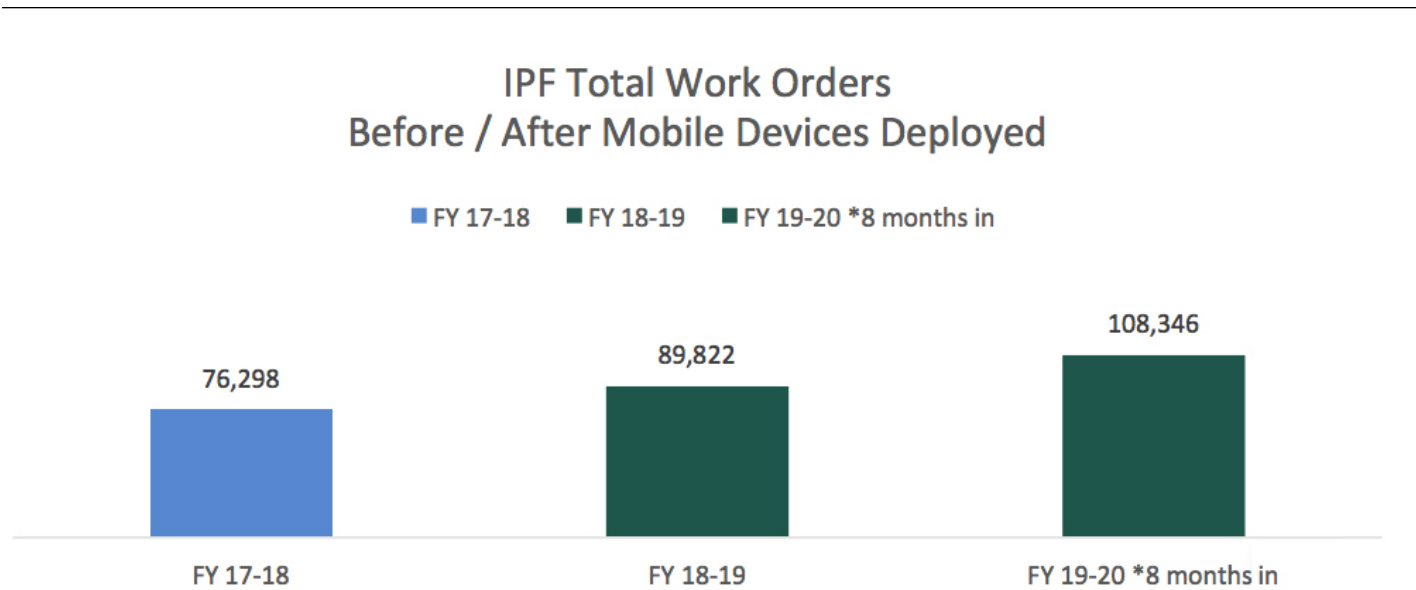
Display 2 - Custodial Services using mobile devices in 2018.

began changing the business out of desperation, focusing on creating alignment through a department mission and strategic plan, and changing many approaches to leadership.

One problem we identified was our lack of inclusion when it came to information-sharing, decision-making, and access to other functions (e.g., participation in advertised “all-staff meetings,” access to minutes of meetings, neglect of weekly one-on-one “check-in” meetings with each employee, distribution of cellphones). With the advent of the smartphone, we considered how we might use it as a platform to help increase access to information, empowering our work crews out in the field to make better-informed decisions. Unfortunately, very few of our employees owned smartphones, and none had been provided with a work device that could make cellular calls or access the Internet. This resulted in greatly reduced information-sharing, and anxiety intensified as more technologies were introduced to the workplace. This lack of information-sharing was creating fear, fueling rumors, and ultimately breeding mistrust.

In response, we decided to purchase iPhones and iPads, allowing our workers to decide which device size best helped them perform their assigned tasks successfully and efficiently. We trusted employees to take these devices home each day and to enjoy their personal use, so long as they adhered to university and workplace policies. We also designed the application of

Figure 1: IPF Work Order Data



these mobile devices to take advantage of our multigenerational work crews, assigning younger and more tech-savvy employees to serve as crew “champions” to help (and teach) those who were less experienced with new technologies.

The opportunity we had in this situation—often missed in most organizations—was to ensure that these technologies were deployed in an inclusive way, so that information-sharing could proceed *up* as well as down the hierarchical chain-of-command. We wanted to ensure that each employee’s input went into the creation and utilization of these tools. We met some resistance from outside the organization, with understandable concerns that devices would be broken or misused. Fortunately, this has not occurred. In fact, we have observed just the opposite.

By allowing our staff to take their devices home, these tools became an extension of their livelihood, which is what well-used *and cared-for* tools should be. We significantly increased staff buy-in and sense of ownership not only of the tools but also of our overall mission, and workers became increasingly proficient in their use of the technology. Thanks to this approach, we were able to rebuild trust within our workplace culture.

In 2018, IPF deployed mobile devices to *all* its staff, modifying and adjusting many business processes as a result. We tracked the total number of work orders completed before and after these mobile devices were deployed, and we discovered that the total volume of completed work orders increased by 15 percent in FY 2018–19 and by 17 percent during the first eight months of FY 2019–20. Interestingly, the total workforce employed remained the same during this time. (See Figure 1.)

By deploying mobile platforms to increase the access of information critical to daily decision-making, we have expanded

the community of workforce leaders who are now trusted and empowered to improve how we do what we do. As a result, we have not only improved our workplace culture but also remained competitive in the industry.

2. MOBILE ROBOTICS

**Business Concept.** As we move into the future, mobile robotic devices can be deployed to augment our workforce capacity, playing an increasingly vital role by performing such routine tasks as mowing lawns, removing snow, and cleaning floors. This allows us to reallocate our existing labor force to provide new services, increasing value to the university. For example, we can deploy an autonomous, battery-powered fleet of robotic lawn mowers to work at night, no longer interfering with daytime teaching and research. Or we can deploy a fleet of robotic floor cleaners to operate at night, allowing us to reassign the number of third-shift (nighttime) custodians to the first or second shifts, thereby reducing the health and safety risks associated with this so-called “graveyard” shift<sup>1</sup> and, consequently, improving efficiency.

**The MSU Story.** This link provides a visual display of how mobile robotics have radically improved the way Campus Services operates: (*See Display 3*).

**Approach to Leadership.** At the intersection of repetitive, routine tasks and increasing pressures (especially on labor-intensive businesses) to contain or reduce costs, are robotic machines that enhance workforce capacity through improved efficiency and safety. We have involved our staff in designing the processes and steps we must take to incorporate this technology into our overall operation. Students, temporary workers, and full-time





Display 3 - Overview of landscape and custodial robotic use.

employees worked together with staff leaders to determine the best ways to incorporate and utilize this new technology. Employees acquire an expanded set of skills when deploying robotic devices to tasks once performed by manual labor. Christopher Creel refers to this as “outsourcing inhumane work.”<sup>2</sup>

### 3. OPERATIONAL “DASHBOARDS”

**Business Concept.** Operational dashboards visually display the progress our work crews are making toward monthly and yearly goals. The opportunity to display and exchange such information (metrics related to tasks completed) helps build trust among teams, increases morale, fosters mutual respect between the workforce and supervisory leaders, and inspires pride and accountability as everyone sees that their respective and combined tasks are all moving forward.

**The MSU Story.** This link provides a visual display of how these dashboards have radically improved the way Campus Services at MSU operates: (See Display 4).

**Approach to Leadership.** The manufacturing industry has shown us that, by posting the number of widgets made by first-shift workers, second- and third-shift workers become better motivated to meet their respective quotas (i.e., healthy competition). This can be transferred to the nonmanufacturing sector,



Display 4 - Landscape Services Operational Dashboards (2019).

inspiring us (for example) to publicly post our landscape services metrics. One happy and hoped-for consequence of this was to break down tensions and animosities between work crews who often believed that some crews were slacking off while others were doing most of the work. Publicly displaying daily “work-completed” data actually increased mutual respect and a shared understanding of how each crew and employee is part of the larger operation, working together to achieve larger corporate goals. This alignment is what every good leader should hope to achieve, and publicly displaying crew-specific metrics aligned with respect to larger organizational metrics helps to move us more decisively in that direction.

### 4. INTEROPERABILITY

**Business Concept.** Interoperability is the ability of computer systems or software to exchange and make use of information. In August 2004, the National Institute of Standards and Technology (NIST) published an article<sup>3</sup> providing quantified measures of the lack of interoperability of information technologies in the capital facilities industry, which hampers that industry’s ability to integrate design, construction, and operational processes. Incorporating interoperability in the workplace enables a more intentional focus on how best to optimize every hour of work performed there.

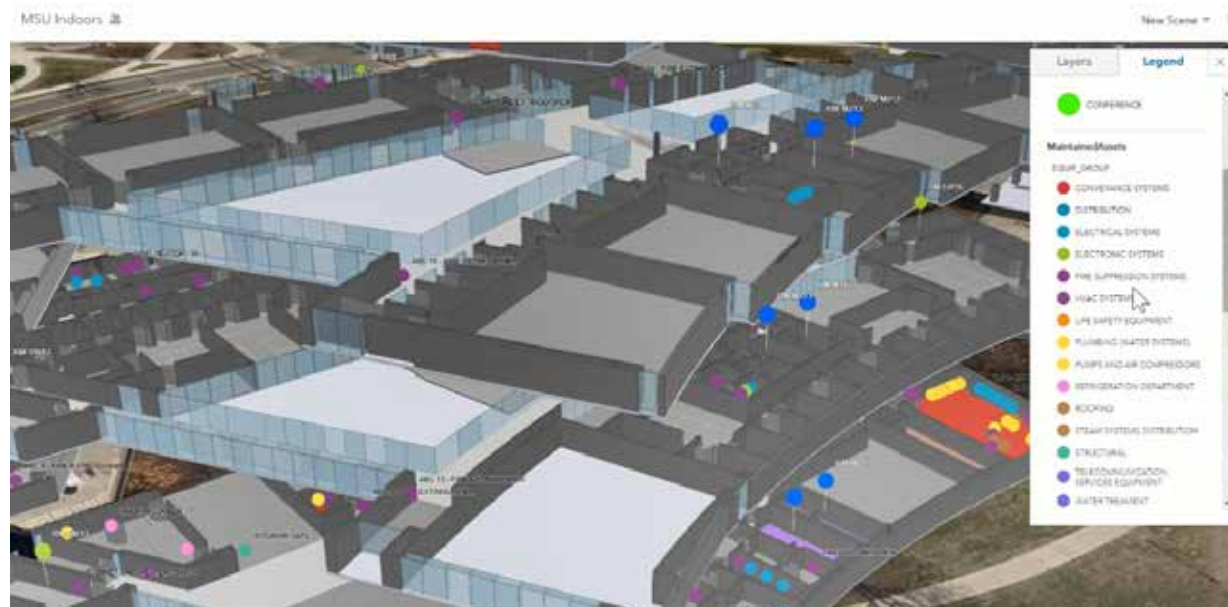
**The MSU Story.** Interoperability is not yet a part of the MSU “story,” but it is clearly looming on the near horizon. This link provides a brief, visual display of the ways in which interoperability (e.g., of geographic information systems and integrated work management systems) can be deployed to manage facilities more efficiently: (See Display 5).



Display 5 - ArcGIS Indorrs Marketing Video.

**Approach to Leadership.** In 2019, IPF began a three-year project to map all assets within the facilities it maintains. The purpose was to identify both the physical location (geospatially within the building, floor, room, and location within the room) and the current condition of those assets, as well as any associated work records maintained in the university’s Integrated Work Management System (IWMS). IPF maintains approximately 24.5

**Figure 1: IPF Building Asset Mapping**



million gross sq. ft. of space on campus. “Assets” fall into such categories as HVAC, electrical, electronic, plumbing, telecommunications, fire suppression, etc. (See Figure 2.)

The NIST study notes that the *lack* of interoperability of information technologies results in approximately \$0.33 per square foot (in labor, supplies, etc.) being *wasted* because the workforce does not have efficient access to information critical to daily decision-making. For MSU, this translates to almost \$8 million wasted each year that we could recapture in workforce efficiency, accomplishing even more work with the same-sized workforce.

For years this opportunity has been largely ignored in our industry; but the new technologies being developed will enable leaders with vision to better equip their workforce with access to this type of information, putting them at the forefront of recovering efficiencies that had been lost due to lack of access and interoperability of information systems. More importantly, employees who are empowered with this level of information pertaining to their specific jobs will acquire a sense of ownership and confidence in mastering their specific crafts—not just “making repairs” but mastering asset diagnostics, essentially becoming stewards of MSU’s critical asset infrastructure.

## 5. EXOSKELETON SUITS

**Business Concept.** It is exciting to imagine how exoskeleton technology can improve the safety and productivity of work crews out in the field. For example, landscape professionals who are installing retaining walls or moving pallets of materials into tight, confined spaces no longer need to strain with heavy objects or request backup workers for assistance. Instead of dispatching a trailer, a forklift vehicle, or a skid-steer loader to a

job site to move heavy objects (e.g., balled-and-burlapped trees, boulders, palletted supplies), a worker can put on an exoskeleton suit that will literally do the heavy lifting. The possibility of dramatically reducing landscape-related injuries (from lifting and twisting) is unprecedented. But this is only the tip of the iceberg: Other industries on campus can benefit from this technology, especially those that involve lifting, drilling, and overhead work (where muscle fatigue can set in rather quickly, leading to loss in productivity and potential injuries).

**The MSU Story.** Exoskeleton suits have not yet become part of the MSU “story,” but they, too, are clearly looming on the near horizon. These links each provide a visual introduction to the ways in which these suits can be deployed to increase the efficiency and productivity of the work we do: (See *Displays 6 and 7*).

**Approach to Leadership.** At the 2020 CES (Consumer Electronics Show) international trade show, Delta Airlines announced a partnership with Sarcos Robotics to deploy exoskeleton suits with their baggage-handling crews to improve efficiency and to reduce fatigue and workplace injuries. NBC News published an article<sup>4</sup> describing various uses of this technology. We need to be thinking now how we can acquire and deploy this technology into our business models to disrupt the negative cycle of workplace injuries resulting from physically demanding jobs.

Using this technology does more than show the workforce how serious the organization is about addressing workplace injuries. It also signals its commitment to creating access to more career pathways. In labor-intensive industries with heavy-lifting requirements, this technology is literally a game-changer. This is





Display 6 - Delta Partnership with Sarcos Robotics.



Display 7 - Various Uses of Exoskeleton Suits.

most exciting for people who previously did not consider a labor-intensive career track because of concerns about meeting lifting requirements.

This technology opens up doors for these people to work in a particular industry and not be concerned with physical limitations that may have discouraged them in the past. And for older employees, this technology could extend their employment in that industry by another 5, 10, or even 15 years, lowering the number of those who either go out on disability or require other workplace accommodations. A multigenerational workforce in this industry also provides opportunities for older employees with lots of institutional knowledge to mentor new ones into the workplace culture. The organization also benefits by financial savings from fewer on-the-job injuries that result in loss of productivity.

## 6. A Smart Campus Operations Center

**Business Concept.** The opportunity exists to link multiple around-the-clock functions—building controls and automation, autonomous vehicles/shuttles, mobile robots—into one “smart” campus hub. In this centralized location, all these various functions can be constantly monitored and analyzed across the entire campus (indeed, across an entire city!), allowing appropriate intervention when necessary.

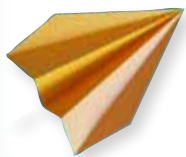
**The MSU Story.** Figure 3 provides a picture of what a Smart Campus Operations Center on the MSU campus might look like.

**Approach to Leadership.** In the future, world-class university campuses will require a sophisticated integration of systems, services, and data so that their operations can proceed efficiently and safely. There will always be a need to improve our support

Figure 3: A Typical Smart Campus Operation Center, rendering by FTCH and IPF







functions and to accelerate academic design and research in the fields of mobility, automation, robotics, and information management. Imagine the strategic alignment of such things as building-automation control systems, traffic systems, autonomous vehicles, and robotic fleet management systems, all gathered together in one centralized facility where these (and other) technology systems can be constantly monitored and integrated with the pool of available human workers.

For example, as autonomous vehicles and mobile robotics begin to increase in number and sophistication, the need will also arise to monitor, control, and process the large data sets that just these two technologies alone will generate. A center such as this will be cutting edge, perhaps even spawning new technologies. IoT (Internet of Things), cybersecurity for interconnected autonomous vehicles, robotics, and building-automation systems will soon become

areas of operations management and research where MSU can position itself as a leader. In addition, MSU provides a unique, attractive campus infrastructure where outside vendors and partners can help leverage the university's assets for research and development.

The way in which designated leaders draw employees and work crews into the planning and efficient functioning of such a centralized operations center will be critical to its success. Because a high level of trust is essential throughout the workplace, all employees need to realize that these new technologies may require new training to provide teams of technicians with the skills and abilities to operate such a facility and to connect the various technologies synergistically across the campus.

A facility like this will also require us to cast aside the old "sil mentality," leveraging the strengths of individuals and departments while dismantling the territorial lines traditionally drawn not only between the university's support side and its academic side but also between the institution itself and those outside of it. There will be a larger number of more diverse stakeholders in this unprecedented kind of operation.

For many, all of this can be a frightening prospect. If nothing else, the past has taught us that when something radically new occurs, fear of the unknown creeps into the conversation and soon threatens to overwhelm it. How leaders address this fear with the rank-and-file will be extremely important. If managed well, the impacts can be far-reaching and "disruptive" in a positive sense to how we have always operated a campus. The goal, of course, is to promote improvements to safety, to energy use in facilities, and to the overall experience of campus life at Michigan State University.

Automation, robotics, sensors, exoskeleton suits, and other new technologies will continue to impact how we operate. They will truly disrupt the old routines. It is doubtful that our current approaches, patterns, and routines of leading the workforce will be adequate to the task—they must also be disrupted.

As leaders, the relationships we build and the levels of trust we create within the workforce—as we focus on the needs of our employees—will go a long way toward building and nurturing a work environment that can not only withstand the unanticipated challenges that will surely arise in the future, but can also move our operation to an even higher level of performance. §

#### ENDNOTES

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2. Christopher Creel, *Adaptive: Scaling Empathy and Trust to Create Workplace Nirvana* (Lioncrest Publishing, 2019). See <https://www.authorhour.co/adaptive-christopher-creel/> (accessed April 30, 2020).
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This paper was originally prepared for the 45 frontline supervisors employed by Campus Services, Infrastructure Planning and Facilities at Michigan State University. It has been revised to address a broader audience. The authors wish to thank Gary Herion for his assistance in editing and revising this paper.

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By Tim Keane and William Rhoads, Ph.D.

# **WATER STAGNATION** and Reopening Our Campuses After COVID-19





**T**here is widespread concern that systemic water stagnation caused by low building occupancy due to COVID-19 social distancing efforts will cause the development of water-quality problems, including the growth of opportunistic pathogens.

We recently coauthored a paper titled “Considerations for Large Building Water Quality after Extended Stagnation,” which applies to COVID-19 response.<sup>1</sup> The paper outlines the concerns over water-quality changes in building plumbing systems and highlights some of the considerations for their prevention and/or remediation.

While academic institutions experience widespread stagnation annually during summer months, it is suspected that COVID-related stagnation is more extensive and of longer duration than normal. It is unknown how longer-term water stagnation will impact water quality, but a precedent of concern is the high percentage of Legionnaires’ disease outbreaks commonly associated with construction and renovation projects that can sit for weeks to months. To address this concern, public health guidance issued by the U.S. Centers for Disease Control and Prevention (CDC), the U.S. Environmental Protection Agency (EPA), and individual state departments of health (e.g., from Washington State Department of Health) recommend actions that can be taken to prevent or remediate potential water-quality issues that may have developed during COVID-19 shutdowns.



A particular challenge is the unknown impact shutdowns will have on municipal water systems. An American Water Works Association (AWWA) webinar titled “Returning to Service: Addressing Water Quality in Buildings with Low or No Use”<sup>22</sup> included a presentation by Alex Margevicius of the Cleveland Division of Water that showed the impact of COVID-19 on water-use reductions. In the figure that follows, the black dots represent customers with dramatic water-use reductions. As water demand across the entire water supply system decreases, water quality delivered to individual buildings may have less residual disinfectant and may require more flushing than normal to establish “fresh” water quality at the entry point to individual buildings.

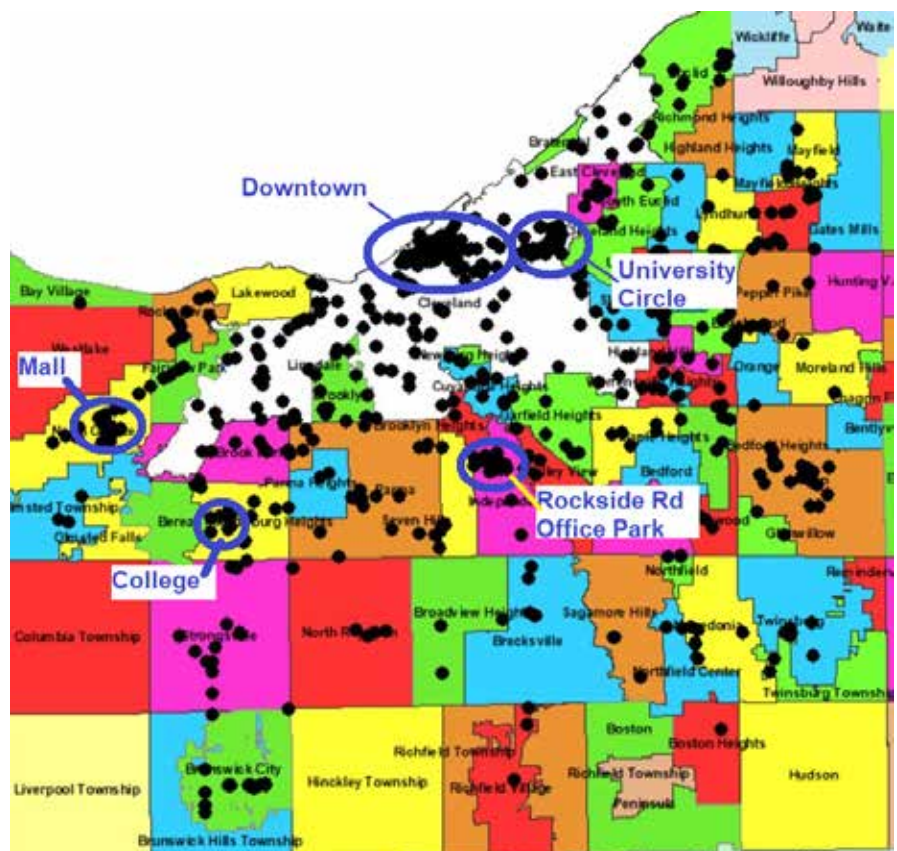
This three-part article explains 1) why waterborne disease issues pertain to large academic institutions, 2) the utility and limitations of long-term water management, and 3) what can be done now to decrease potential issues from developing prior to widespread university reopenings.

## PART 1. EDUCATIONAL FACILITIES ARE NOT IMMUNE TO INCIDENCE OF WATERBORNE DISEASE CAUSED BY OPPORTUNISTIC PATHOGENS

There is a misconception that waterborne disease caused by opportunistic pathogens only occurs where there are high concentrations of immunocompromised people. A large outbreak of waterborne disease is unlikely at an academic or educational institution because of the young and healthy demographic that makes up the majority of consumers there. However, these facilities are not immune to the growth of waterborne pathogens such as *Legionella pneumophila*—the cause of Legionnaires’ disease and most reported cause of waterborne disease outbreaks in the United States. It is important to recognize that people with underlying health issues who are more likely to become ill after exposure to opportunistic pathogens still occupy and use water in academic buildings.

Another common misconception is that responding to just one case or even a suspected case of waterborne disease is not warranted. The disruption to daily operational and administrative activities that occur when responding to isolated or suspected cases is a fraction of the effort and expense required in responding to a second case or outbreak (not to mention having to deal with media coverage of the problem). With one case, simpler remediations can be applied, including online disinfection of building systems, minor alterations in mechanical plumbing

**Figure 1: Water-Use Reductions in Cleveland, Ohio**



*Reprinted with permission of AWWA.*

designs, replacement of high-risk fixtures, and instituting systematic control policies to detect problems early on.

## PART 2. DEVELOPING A WATER MANAGEMENT PROGRAM: ADDRESSING ENGINEERING OPERATIONS AND MAINTENANCE ISSUES

Public health recommendations focus on the development of comprehensive water management programs to address issues related to water quality in building plumbing. The core function of a water management program is to ensure that facility maintenance managers and engineers have thoroughly assessed risks found in their facility and have put a program in place to prevent issues from developing and/or detect and respond to issues before they impact public health. Key elements of a water management program as required by ANSI/ASHRAE 188, the industry standard Legionellosis prevention document, include:

1. Develop a program team
2. Describe building water systems/develop water system process flow diagrams
3. Analyze building water system hazards
4. Define control measures, control locations, and control limits
5. Conduct routine monitoring to verify control measures are met



6. Validate program control
7. Document that the program is implemented and meeting defined control measures

While the basic requirements of an ANSI/ASHRAE 188 program are clearly defined, there are many interpretations on how best to implement these programs. There are important considerations for some aspects of implementing water management programs that facility managers should consider, particularly when external parties are providing contracted or consulting services for the water management program.

**Developing the program team.** From central plant equipment failures, to new or alternative approaches taken by the engineering department during construction projects, to routine flushing and maintenance practices used by custodial staff, communication across team disciplines is essential and ensures that responses to potential issues are communicated and coordinated. The team should include key personnel involved in new construction, plant operation and maintenance, housekeeping, health and safety, and facilities management. If the team chooses to include a water management consultant to support decision-making, we recommend that the consultant should be a voting member of the team and have an engineering background in building water systems. Specific utility or mechanical system contractors (e.g., cooling tower contractors) should also be considered as team members.

**Analysis of building water system hazards and program confirmation.** The identification of potential root causes of water safety issues that should be addressed by water management programs is the most consequential step in developing a successful, cost-effective *Legionella* risk management program. While ANSI/ASHRAE 188 requires confirmation that water-quality hazards are under control, it does not require *Legionella* testing. We recommend routine collection of *Legionella* samples as part of the water management program. However, if not part of a water management program, sampling should be conducted with caution in the absence of a suspected associated case of waterborne disease.

For cooling towers, the simplest solution is to include requirements in the water treatment contract stating that the supplier must comply with applicable standards and guidelines, including ANSI/ASHRAE 188 and ASHRAE Guideline 12 related to minimizing *Legionella* growth in building systems. Many water treatment companies can effectively and efficiently manage risk in cooling towers.

Assessing risks in potable water systems is more complex due to dynamic use patterns, complexity and variability in design, direct consumer exposure to water, and the larger number of stakeholders involved in operating and maintaining these systems. Thus, sole-party management contracts—from water manage-

ment team leadership to sample collection and analysis—are more difficult to execute and are fraught with potential conflicts of interest that facility managers should be aware of. The leader of the water management program team or any contracted consultant should have extensive knowledge of potable water system design, operation, and maintenance and be familiar with issues regarding *Legionella* control. It is easy for experienced facilities personnel or mechanical/plumbing/water treatment engineering professionals to learn the specific issues related to control of *Legionella* growth. However, in complex systems or where institutional knowledge or personnel are limited, it can be appropriate to hire external consultants to provide *Legionella* risk management program oversight.

Sampling potable water systems is also complex. The number, location, and types of samples collected are highly dependent on individual system features. Sample collection can be effectively executed by onsite personnel or competent technicians. If the consulting firm provides both water management program oversight and laboratory analysis, we recommend that a third-party design and validate the sampling plan, as there is a conflict of interest in generating revenue through additional laboratory analysis. We also recommend that sampling plans be focused on high-risk areas such as residence hall and gymnasium showers, or on high-risk devices such as outlets with low flow rates and thermostatic mixing.

Laboratory methodology is also important to consider. Laboratories performing *Legionella* cultures must be CDC ELITE (Environmental *Legionella* Isolation Techniques Evaluation) program certified and must perform culture-based analysis. Molecular-based detection of *L. pneumophila* genetic material (i.e., through polymerase chain reaction [PCR] or quantitative PCR) in cooling towers can provide near-real-time results for decision-making, particularly with new assays that can be executed while contractors are onsite. If there is a potable water outbreak and immediate results are needed, there is a value for the added expense associated with molecular testing to expedite the outbreak investigation.

For routine monitoring, molecular-based techniques can be used as a screening tool to determine which culture samples are prioritized. However, it is important to recognize that molecular testing will greatly increase costs and also detect dead cells or cells that are not culturable, potentially overestimating or confusing risk analysis. Culture testing is the gold standard for assessing risk of disease occurrence and includes established guidelines for how to respond to positives. Documenting culture results is also the best method to validate the success of a water management program from a legal liability perspective.

### PART 3. WHAT TO DO NOW TO REOPEN BUILDINGS AFTER COVID-19 SHUTDOWNS

The overarching challenge for facilities in developing an effective water management program and executing public health recommendations for buildings is the time and resources



involved. Given the number of demands they face while adapting to COVID-19 social distancing guidelines and other maintenance issues, most facilities will find it difficult to fully develop and implement an effective water management program if they do not already have one in place. Instead of trying to expedite the process and potentially developing an ineffective program, we recommend that facilities focus on effective auditing of building water systems now, and develop a full water management program later, as some of the other COVID-19-related responses dissipate.

Likely the most important aspect of controlling *Legionella* and other opportunistic pathogens is confirming that the main systems are operating under recommended parameters. Hot water should be generated at temperatures >140°F, temperature at fixtures should stabilize >120°F, and systems with multiple return loops should be confirmed to be balanced (i.e., evenly distributing the recirculated hot water throughout the building). The following table shows the reported *Legionella* growth temperature ranges from the recent International Association of Plumbing and Mechanical Officials (IAPMO) UPC 2021 plumbing code.


Legionella Growth Potential	Temperature (°F)
Minimal	<77
Low	77 to 85
High	85 to 110
Moderate	110 to 120
Low	120 to 130
None	>130

Other immediate recommendations include performing routine or remedial flushing of the water systems or performing remedial disinfection. Flushing water consists of opening the outlets within the building to replace stagnant water with fresh water from the water supplier. The goal of routine flushing is to simulate normal water demand in the building and replace water frequently enough to prevent water-quality issues from developing. While this practice can be scaled up or down based on building occupancy levels, it is difficult to implement in fully vacant buildings, and there is no established guideline to define how much flushing is necessary or how frequently to flush to avoid all issues.

Tim Keane's "how-to" guide, *Developing a Building Potable Water System Flushing Program*,<sup>3</sup> details recommended actions

when reopening buildings after stagnation. This document covers startup flushing procedures, practical tips for some critical pieces of mechanical equipment, and when to consider building system disinfection. The sections of the guide that deal with building stagnation are based on recommendations presented by ANSI/ASHRAE 188 for commissioning new buildings.

For instance, ANSI/ASHRAE 188 states that if occupancy of a new building is delayed more than two weeks but less than four weeks after it is disinfected, all the outlets in the facility should be flushed; if occupancy is delayed more than four weeks after disinfection, the need for additional disinfection, flushing, or both should be assessed. While it's unclear how this guidance applies to buildings that are not associated with new construction, these are logical benchmarks to consider when developing system-specific recommendations in the absence of other preventative actions.

There is no simple, one-size-fits-all answer, and many building managers must make decisions about their particular facility and risk factors, and what level of response is appropriate and achievable. The recommendations provided in the guide discuss methods for large, circulated hot water systems and for small, uncirculated hot water systems, and provide a solid starting point for making facility-specific recommendations. 

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# Potty Parity

## in Performing Arts

By Rose Steele



The line at the restroom—ah, how well we women know it! Do you dash from seat to line, bowling over older and smaller folk, entertaining the vain hope that you might also get a beverage before intermission is over? Or do you use tactical preplanning—no beverages for at least two hours before showtime? No matter how flippantly described, these are only two of the strategies women contemplate before nearly every public performance event. And we've all heard stories of women storming the men's restrooms. We'd love to be in one of those lines now, wouldn't we? No, of course not! But it would mean that live events were on again and we felt safe enough to attend them. But why is this still happening after so many years, even in new facilities? How will the pandemic change it, during and after?

Pre-pandemic, it happened because building codes do not require enough women's stalls to accommodate the demand in assembly spaces. Despite improvements over the last 30 years, codes still ignore the following key issues:

- More women attend group cultural events than men, at about a 65/35 ratio (depending on what research is used; the number can drop to 56/44). Codes presume a 50/50 ratio.
- Women tend to take longer in the restroom than men.
- Restroom load is concentrated at certain times: intermission, half-time, seventh-inning stretches.

Some venues, such as The Berliner Ensemble (<https://www.timeout.com/news/this-berlin-theatre-has-nailed-socially-distant-seating-052920>), are experimenting with no-intermission events so that the restroom load is spread out and lines are short or nonexistent, but I think that audiences will not embrace this solution long-term. No one wants to miss anything, just like no one wants to go to the restroom during a movie. There could be a huge new market for that app that tells you the best time to go during a movie, but I won't endorse it by naming it here.

Right now, very few public events of the type that require large public restrooms are happening, and operators are working incredibly hard to develop opening plans that are safe for patrons

and will stave off financial collapse for these institutions. These places will reopen, slowly, partially, at first, but they must return to a capacity that works financially. Both partial and full reopening will revive this issue.

Limiting attendance will reduce the demand temporarily, but social distancing will increase the physical space that lines require. The increasing understanding of the importance of thorough handwashing will slow passage through restrooms even further, so it's possible the line time required to use the facilities will not shorten with fewer users; and as capacity increases, the problems may be worse than before.

Developing information about possible spread by blow dryers and toilet flushing seems to call for some remodeling of facilities immediately, to include toilet lids and to remove dryers. Providing and stocking toilet seat covers will be more important than ever, as will thorough and regular cleaning and disinfecting, but that presumably does not take place at intermission and is a separate issue from stall count. However, an employee stationed in the restroom continually disinfecting faucets, door handles, etc., could greatly reassure patrons and provide a few extra paid hours to casual front-of-house employees in tough times—if the venue can find the dollars.

The long-term solution, of course, is more women's stalls. But why is it so hard to implement? The obstacles are easily identified: Problem number one is money—plumbing is expensive, and toilets produce no revenue-generating floor space; therefore owners, developers, and architects are strongly incentivized to minimize them. In a for-profit world, building-code updates would be considered the logical mechanism for change, but building-code changes are too slow and too incremental to address pandemic issues in the short or medium term, so local solutions will have to be created, either by county health officials or venue operators themselves.

In the nonprofit world, primarily arts venues, money is also an issue, but operators generally have more power to demand higher women's toilet counts. Theatre managers are asking for more stalls during design, but they also lack solid data on which



to base the numbers. Enlightened architects proclaim, “We’ve provided twice as many women’s stalls as men’s!” without considering the attendance ratio and without considering whether that is a meaningful reference. Other than the women still standing in line, who cares how many more women’s stalls there are than men’s? The valid question is, “How many are needed?” Or rather, “How many more?” What do we need to know to get it right, and how do we apply this information to a concrete solution?

I suggest the following steps: First, define the goal—is it to have no line at all at the women’s restroom? Limited lines? Or do you really want to provide only the code minimum for some reason and let the owner deal with the complaints?

Second, do some research; when you go to an event, pay attention to the number of stalls, the length of the line, and the actual time of intermission. I have been to older facilities where intermission stretches to 25 minutes or more to accommodate the restroom line. This is not good for maintaining the emotional flow of an event and audience engagement. It’s also hard on folks paying babysitters or counting on public transportation when shows go too long. (But it does provide time to sell more drinks, so there is a small silver lining.)

Poll other facilities: Talk to house managers and staff to determine the ratio of seats to fixtures and their experience with lines. Do not expect exact answers. You will be surprised how few staff members can tell you how many stalls their building has.

Analyze the results against whatever benchmarks you can, including perhaps, the goal to provide enough fixtures so that a person of either gender can get in and out of the restroom and still have time to get a snack during a 15-minute intermission. Of course, this also assumes enough concessions service, but that’s another story. It does not necessarily mean no line at all.

The formula we have settled on is as follows: Given a gender attendance ratio of 65/35, we multiply seat count by the appropriate percentage, and allow 1 fixture for every 35 women and 1 for every 45 men. Ideally, provide a sink for every 2 fixtures, each with its own soap dispenser. Provide a towel dispenser for every 2 sinks (see above; no more blow dryers, please). Place trash cans at exits (which allows for using the towel for grasping the door handle, then dropping the towel in the trash, which is good practice in these times). Mind you, budgets seldom allow for actually meeting that count, but it’s a good target.

Let’s compare results between the

code, the “double-the-men’s count” idea, and our suggested formula, using a 2,500-seat civic theatre as an example; this is a fairly typical size for a concert hall or touring house. Pay attention—the math is easy but there are a lot of variations.

I compared the 2019 California Building Code (CBC) and the 2018 IPC (International Plumbing Code, part of the International Building Code), doubled the CBC men’s count and applied my 65/35 ration with 1 fixture for 35 women and 1 for 45 men. The results are shown in Figure 1.

The 2019 California Building Code (which is based on the Uniform Building Code, Table 422.1) requires fixtures on a graduated scale; I will not quote it here, but it is easily available to review.

The 2018 IPC simply requires 1 fixture per 125 men and 1 per 65 women, and only 1 lavatory per 200 persons and 6 sinks for each gender!

Using the 65/35 gender ratio *and* allowing more stalls for women at 1/35 versus 1/45 for men, **the resulting fixture count is 46 women’s stalls and 19 men’s fixtures**. As you can see, the code isn’t even adequate for men in our formulae above—which suggests that 1/45 may be rather generous in the men’s department.

In analyzing, researching, and developing fixture counts, remember that the size of the venue and the number and location of restrooms must also be considered. Code requirements are better for venues of around 500 seats, but still stingy. Smaller venues tend to have smaller lobbies, too, which means less space

Figure 1: Code comparisons for restroom fixtures

Source	Women’s Fixtures	Lavatories	Men’s*	Lavatories
CBC	15	9	12	6
IPC	19	6	10	6
Double CBC	24	18	12	6
1/35-1/45	35	17	28	14

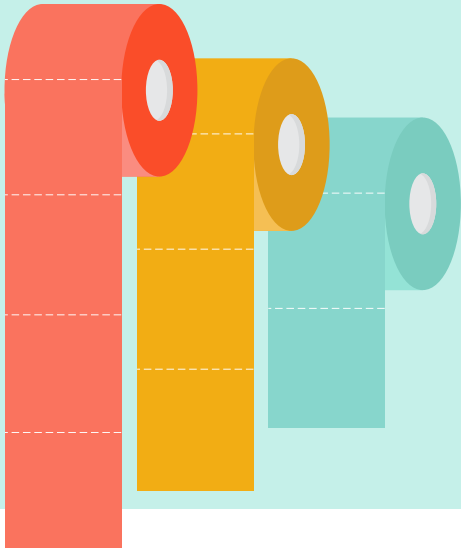
\*Total of stalls and urinals

Results at 50/50 gender split

CBC	1 stall per 83 women
IPC	1 stall per 66
Double CBC	1 stall per 52
1/35-1/45	1 stall per 35

Results at 65/35 gender split

CBC	1 stall per 108 women
IPC	1 stall per 85
Double CBC	1 stall per 35
1/35-1/45	1 stall per 46



to keep restroom lines unobtrusive. Sports arenas are presumed to have a higher male-to-female attendance ratio, but every story I have heard about women storming the men's room has been at a sports stadium. It is far from an exact calculation!

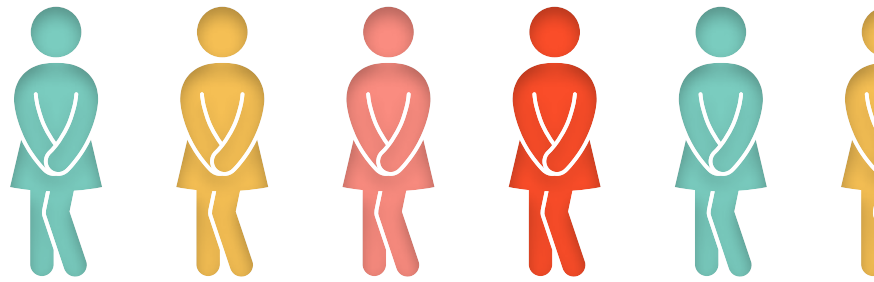
If individual restrooms are very large, then for large concert venues or stadiums, consider lights or other indicators to identify vacant stalls. At one concert venue in my area, restrooms are so large that a staff member directs patrons to open stalls, which prevents patrons from losing their place in line while checking for open stalls but requires a paid employee.

Depending on overall venue capacity and configuration, consider restrooms in multiple locations, but do not provide too many options—women won't risk moving from a 5-stall restroom on the chance that the next one has a shorter line.

Definitely consider gender-neutral facilities—increasingly it seems both practical and equitable. Full-door stalls with good-quality locks and a generously sized circulation area can provide an appropriate level of privacy as well. This may be an especially good option for facility renovations, where new restrooms are cost prohibitive or impossible due to site conditions. Full-size doors and toilet lids may also help contain the spread of viruses and bacteria during this pandemic and the inevitable next one, and alleviate opposite-gender concerns for parents. And this downtime may provide opportunities for remodeling that would ordinarily be extremely disruptive to the event calendar, as suggested by an excellent article by Howard Glickman of Auerbach-Pollock-Friedlander consultants ([https://www.auerbachconsultants.com/wp-content/uploads/APF\\_Thoughtful\\_Performance\\_Space\\_Improvements.pdf](https://www.auerbachconsultants.com/wp-content/uploads/APF_Thoughtful_Performance_Space_Improvements.pdf)).

Some theatre managers worry that their older audiences will be uncomfortable with this, and although examples are still rather limited, anecdotal reports indicate this is not the case in practice. Family restrooms with sinks, baby-changing stations, and adequate size for an attendant can still be separate or incorporated within the larger restroom. This solution has everything to recommend it—it is bias-free, eliminates the concern about the gender of the cleaning staff when the facility is open, and allows the most efficient use of existing or new stalls. Urinals can be eliminated or shielded as needed for the desired level of privacy.

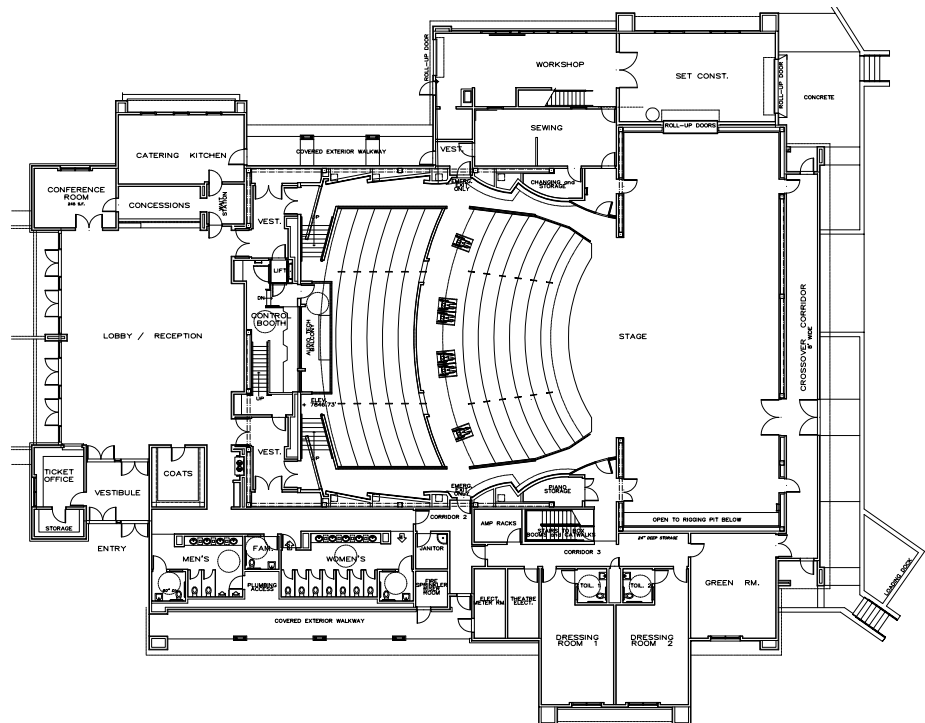
Don't forget the backstage facilities—most performers will also have to use the restrooms at intermission, especially bands and orchestras; 2 stalls



are insufficient if the group is 120 strong. Tech staff is generally discouraged from entering performer dressing rooms, so toilets available to all are required, and at least one *very* close to the stage. Here again, gender-neutral facilities simplify meeting these requirements.

A caveat: For educational facilities with traditional gender-based restrooms, there may be pushback under the heading of “parity,” an important concept in school design, and which has as many definitions as there are campuses and school districts. I have been told that providing more women's stalls than men's violates parity requirements! This is yet another argument for gender-neutral accommodations. I have been involved in two completed school projects with gender-neutral facilities backstage, and each reports total acceptance and no issues to date.

I know of one example of something akin to “parity” in the professional world. A concert venue, which shall not be named, was recently beautifully renovated from a ramshackle affair with plastic folding chairs and wooden bleachers to a steep bowl of seats with good sightlines, lots of food and beverage service (including fine dining), and views of the nearby cities and mountains. It is a popular location for performers and audiences and is unique in that it has neither enough women's nor men's stalls!



Sample design showing an in/out arrangement that's good for managing lines and social distancing.





Photo by Rose Steele

Only 4 stalls in this restroom at a 324-seat theater.

Why so few? I can only speculate of course, but the likely answer is that they provided something like the code-mandated number, then made the assumption—correctly—that audiences would put up with it to see the acts on the bill. However, there are a few restrooms in the fine-dining and VIP areas for top patrons. This is, of course, a for-profit venue.

I will close with a happy story. A nonprofit touring house on

a major university campus recently upgraded their 3,000-seat facility with a major restroom addition that increased their fixture count from 22 women's fixtures to 110 (a ratio of 1 stall to 17 women at 65/35), with a sink and paper-towel dispenser for each 2 fixtures as well as indicator lights for occupied and open fixtures. (The men's count remained at 40 total, which was and is adequate.) It was costly, but the lack of women's stalls had been the number one complaint in this facility, which originally opened in 1964.

So, there is some progress and some hope. Due to the number of historic and older theatres in North America, change will come slowly. But switching to gender-neutral facilities could greatly reduce the problem, or at least spread it equally among all patrons. Furthermore, those of us in design and construction industries must tell the code-writing bodies to reassess the plumbing-fixture requirement in assembly venues, and we must take seriously the very real plight of female patrons in the buildings we design. 💰

Rose Steele is owner and founder of Rose Steele Theatre Consulting, San Jose, CA; she can be reached at [rose@roseeleconsulting.com](mailto:rose@roseeleconsulting.com). This is her first article for *Facilities Manager*.

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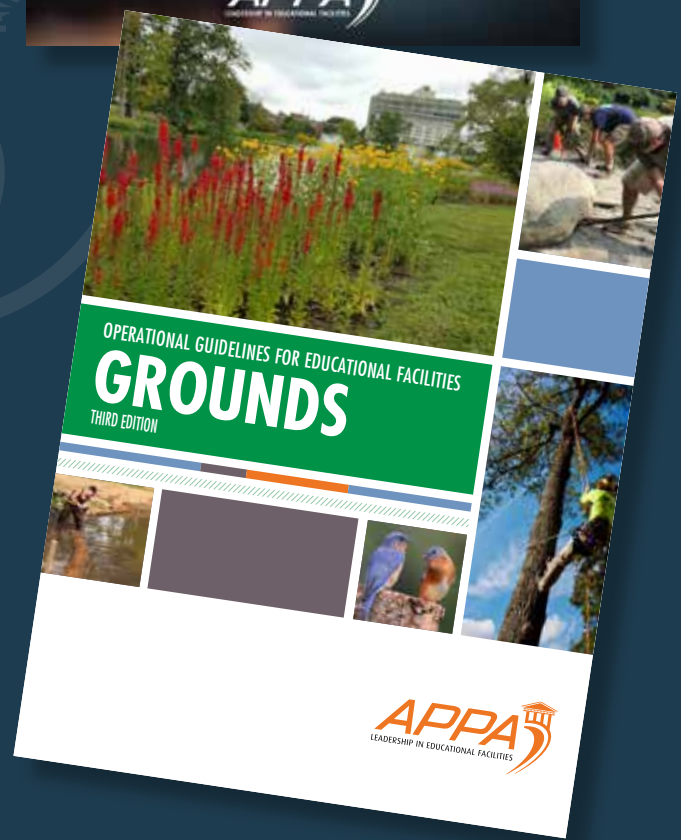
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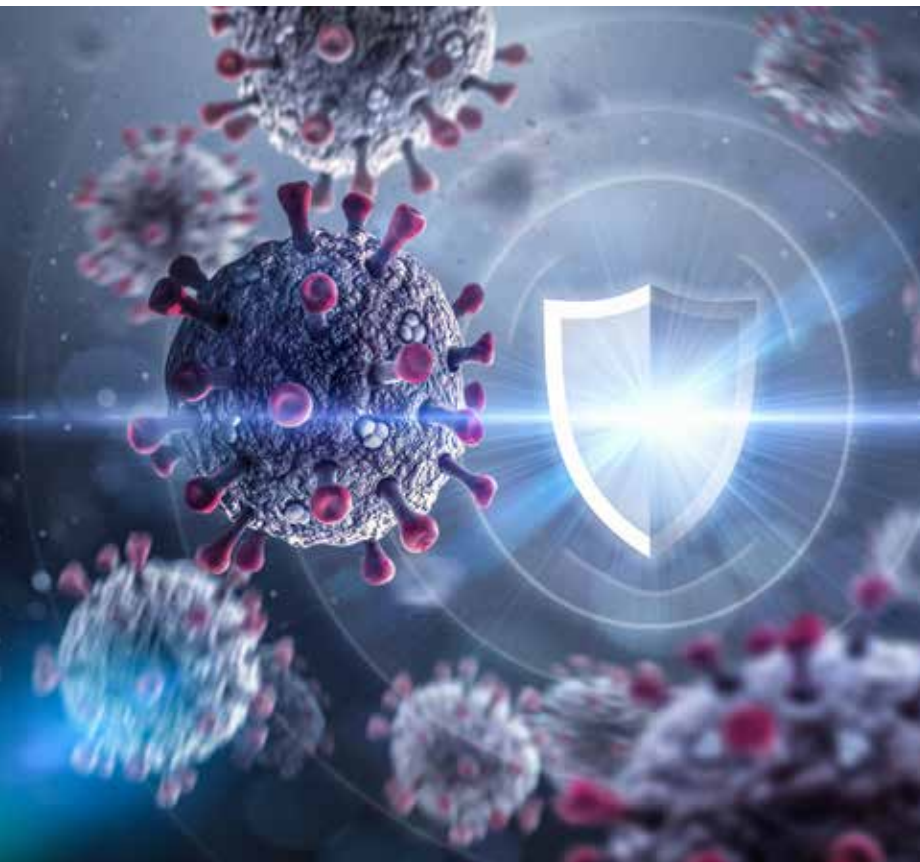


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# COVID-19's Impact on Facilities Cybersecurity

By David Handwork



“COVID-19 changes everything.” Since early March 2020, this statement keeps popping up, morphing, and adapting to fit the context of each unique conversation. Indeed, with each advancing day of the 2020 crisis, all of us desire to transform the numerous unknowns of COVID into absolutes and assurances. Leaders of higher education institutions and facilities managers are deeply longing for fiscal certainties. Only time will reveal the realities of enrollments, on-campus housing occupancies, intercollegiate sports, the stability of foundations, federal and state funding, and other sources of institutional revenue. Facilities managers are not generally equipped for a new operations strategy with a future that is ambiguity rich and

clarity poor. APPA’s 2019 strategic plan, “Preparing for Every Future,” is more relevant than ever, and is well poised to equip facilities professionals with tools, resources, and training.

Preparing for any post-COVID future requires a mindset of flexibility, adaptability, courage to take risks, and knowledge-based wisdom, to be able to develop and “sell” a malleable facilities management (FM) strategic operations plan to administration. The impact that FM has on student and staff recruitment is well understood. Equally understood is FM’s impact on operations budget control, specifically related to capital planning, space management, and stewardship of energy, environmental sustainability, and campus assets. The temptation to heavily leverage the facilities operation budget for university budget reductions will be evident, but senior facilities officers (SFOs) should resist this temptation if at all possible. Even with an uncertain future, one predictable post-COVID outcome is the *increased expectation* of even more effective and efficient facilities operations.

Two available resources for facilities managers to address reduced budget expectations are 1) expanded use of automation and 2) emerging FM technology. Arguably the only purposes for utilizing automation and technology are addressing a solution to a problem and/or improving efficiencies. Applied facilities technology is not a panacea for operational budget cuts, yet it will create new efficiency opportunities and provide more cost-effective investments for automation and facilities informatics. Facilities managers should understand that proliferation of operations technology (OT) will create more cyber vulnerabilities with the continued propagation of the Internet of Things (IoT), networked systems, cloud-based software solutions, and evolving “work from home” strategies.

Effective cyber risk mitigation can become a reality for our institutions by embracing the following two principles:



**Principle 1: A healthy SFO and CIO relationship.** This is a primary principle for highly effective applied FM technology. Traditionally, SFOs and chief information officers (CIOs) have limited work engagement at best, primarily interfacing with departments on construction projects. That's unacceptable now and in the future. OT and IoT for typical and "smart" buildings require a higher level of FM and information technology services (ITS) departmental integration and interdependence for building operational effectiveness and security.

SFOs and CIOs need to view each other's departments as partners for achieving the institutional mission as well as supporting each other's departmental strategic initiatives. As a partner to FM, IT departments define and enforce cybersecurity for FM hardware and connected devices. Not engaging ITS can create challenges with OT and IoT deployments, especially when engagement occurs after the concept and planning phases. ITS can advise on industry and campus standards for connected devices. Registering these devices before connecting to the network is typically required for operations and security as well. Along with connected hardware and device standards, CIOs can also support facilities software platforms, especially if data is managed on-premises.

Regardless of reduced budgets, facilities managers and SFOs need to be ready to expand existing technology or deploy new technology. Otherwise, returns on investments can be delayed if cybersecurity standards are addressed postdeployment, or even negate technologies if OT/IoT devices cannot meet cybersecurity standards.

SFOs should work with CIOs and FM operations staff working from home—now and potentially regularly in the future. Remotely accessing energy management systems, work order systems, and other FM-centric software systems became a reality with COVID, something not generally considered prior to the crisis. Remote access, even with virtual private networks (VPNs) or other security measures in place, can create additional cyber vulnerabilities not only for FM systems, but for the whole campus.

The expansion of technologies and automation will continue to create more remote FM operations. For example, night shift custodial staff may work from home managing automated floor and restroom cleaning equipment, and landscape services may manage automated mowers. These systems are already in service today, not in some future world. These are the types of remotely managed capable

technology that COVID will make cost affordable. But remote connectivity, even with low-bandwidth residential systems, will require support from ITS departments to be functionally effective and secure.

**Principle 2: A healthy knowledge of facilities technology.** SFOs and key FM leadership must become even more knowledgeable about emerging and viable facilities technology. Although ITS can support cybersecurity and data management, they are not facilities managers, and therefore completely inadequate to understand how applied FM technology enhances FM operations. COVID will change the value proposition of many applied technologies, including the emerging field of facilities informatics (applied facilities data science).

APPA membership engagement opportunities will certainly evolve to include more web-based connectivity and information-sharing events, such as the very successful APPA Town Halls that were recently held to share COVID response knowledge. Many institutions will struggle fiscally to justify or even pilot test technology strategies, while others are positioned to execute or expand their technology initiatives. APPA members should proactively share challenges and successes to ensure technology investments produce highly predictable, positive results.

COVID has certainly created significant and lasting challenges. But as APPA members, we are in this together. By collaborating and engaging with each other—member to member, SFO to CIO, peer to peer—we can leverage rewarding technology opportunities while keeping our campuses cybersecure. 💡

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# Building Blocks of Culture for Facilities Management—Part V, Implementing Your Cultural Strategy

By Matt Adams, P.E.



In this, our fifth building block of culture for facilities management, we are exploring how to implement our cultural strategy. Up to this point we've identified the importance of culture as a management tool within our industry, and we've examined how to go about developing our culture and defining it.

The **first building block** emphasized self-examination. In this component, we validated the presence of workplace culture by examining our current work practices, both positive and negative. The **second building block** guided us through the selection of our core values—which are the basis for our workplace culture. In the **third building block**, we

examined the roles of our leaders, champions (those who promote the culture we are trying to implement), and staff, using the servant-leadership model and a 360-degree viewpoint. The **fourth building block** involved publishing our cultural strategy. This is the written document with its various components that lays out our strategy and guides the creation of an engaging workplace. The completion of this step leaves us with implementing the plan.

## THE IMPLEMENTATION

Implementing a cultural strategy is much different than simply managing a project from A to B with checklists, completion dates, and milestones. Building a culture is an emotional process that involves the experiences, beliefs, actions, and results of everyone in the department. It is more of a coaching and team exercise than a project management exercise. The amount of energy, enthusiasm, and persistence that leaders, champions, and staff put into creating culture is directly proportional to the success of that culture. In addition, this task calls for a greater level of individual accountability than is needed for any other job responsibility in the workplace. For the most part, it's up to the individual to be on the honor system and do the hard work. This work involves carrying out "small," daily, monthly, and annual actions; these actions display the attitudes that demonstrate our selected values and ultimately generate the culture.

For their part, leaders need to keep some important points in mind. First, the adoption of a culture is a gradual process that typically takes years, so in order to sustain the amount of effort required by everyone, it's important to recognize wins and successes along the way. Second, leaders need to contribute the most to building the culture. They have participated in selecting the values, identifying the roles of

the staff, and publishing the cultural strategic plan. They must act in the capacity of leaders by example, especially when it is most difficult to do so. Finally, achieving this implementation requires a more sensitive, dynamic, and robust level of communication. It's not enough to check the boxes; it's necessary to listen, to understand, and to recognize if our strategy is engaging our peers or not.

## PLAN, DO, CHECK, ACT

There are several processes available to help facilitate implementation. Some are better tailored for complex projects such as construction or reorganization; others allow more flexibility for issues such as cultural strategy. Recently, at the University of Chicago, we adopted W. Edwards Deming's "plan, do, check, act" process for our values, strategic plan, and Vision 2022 Plan.

In Deming's approach, the "**plan**" stage is the same as the cultural strategy that we published in building block four. However, this plan is a living document and does change over time. There are two distinct phases for implementing the cultural strategy that should be recognized; the first is the adoption phase. This could be considered the most difficult, because it involves the period of time when the plan's activities and initiatives are new and often uncomfortable for those participating. Sustainment is the second phase and lasts anywhere from one to three years after the adoption phase is completed. In this phase, adjustments to the plan are refined and reinforcement of the plan's successful elements become more common.

The second stage of Deming's process is the "**do**" stage. Much of this work has been detailed in the cultural strategy plan, however, leadership and personal determination will be called for, to encourage staff and verify that the multitude of activities required in this stage are taking place. Organizational culture is developed through daily, monthly, and annual demonstrations of the values selected to reflect it.

In addition to actions, artifacts must be created to reinforce the new value-based culture. The leaders and champions of the organization need to foster a sense of accountability to ensure high levels of participation. This will require discussions of ownership and open communication regarding the reaction staff has to the new initiative. Ultimately the activities introduced in this stage gradually become standard and expected.

In the "**check**" stage of the process, we are measuring our progress just as all good continuous

improvement systems do. The first step in this stage is the baseline initial measurement, as described in building block number two. As part of implementing the culture, this measurement is updated or reassessed at least annually. To get a true sense of staff engagement, this measurement should take several forms and is both formal and informal. For this step, it would be reasonable to solicit feedback from all areas of the institution that interface with facilities. Small focus groups would be appropriate, consisting of carefully selected participants who are known to communicate openly and who accurately represent staff who are typically uncomfortable communicating about such issues. Examples of negative values in terms of actions and artifacts would be appropriate feedback to collect during this exercise. As demonstrated in building block number one, this is one effective way to illustrate the current organizational culture. "Softer" descriptions of feelings and experiences in the workplace are appropriate data for this collection effort.

Finally, there is the "**act**" stage. This is the adjustment or alignment stage that utilizes the data collected in the previous step. However, care must be taken not to make major adjustments too quickly, because some changes need to be introduced gradually. The sensitivity required of the leaders, champions, and working group members will become more and more apparent to them during the adoption phase and later sustainment phase of implementation. The activity that takes place during this stage is much like any strategic planning session, where the measured results of success or lack of success are compared against the intended actions and artifacts detailed in the cultural strategy plan. Ideally, one person would serve as a facilitator to help the group compare the measurements to the plan and look for alignment or adjustment opportunities and ideas. The results of this activity and, in particular, the recognition of feedback, must be openly communicated with staff in order to reinforce leadership's determination to recognize that engagement in the workplace can be a subtle feature that is more difficult to measure and identify.

At this point, the "plan, do, check, act" process begins again, and the cycle repeats itself year after year until the organization reaches the sustainment phase of its new values-based culture. §

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# IBT and the Post-Coronavirus Campus: 10 Strategies to Consider While We Wait It Out

By Joseph Bocchiario III, Ph.D., CStd, CTS-D, CTS-I, ISF-C, and John Cook, CTS

“Our Age of Anxiety is, in great part, the result of trying to do today’s job with yesterday’s tools and yesterday’s concepts.”

– Marshall McLuhan

In the post-coronavirus era, what will people need to have the confidence to be on campus with other people again, and what can we do to make buildings cooperate—intelligently—with humans in new ways to maintain our health?

Technologists may have some answers for this conundrum, using many of the intelligent building technology (IBT) ideas that have been developed over the last decade. While the initial IBT focus was building efficiency and maintenance, recent efforts have expanded to include humanistic purposes that leverage occupancy data to support physiological and psychological goals. This shift may help us think about the post-coronavirus campus.

So, while we wait out the virus, what can we do now? Some of the following ideas are practical and some ambitious, but each combines a technology and a human element with an aspirational goal to improve and safeguard our lives.

## 1. *Ensure your foundational communication systems are solid.*

If real-time data of potential risks will be communicated by building-wide emergency messages, campuses should consider updating announcement systems to comply with standard NFPA 72: *National Fire Alarm and Signaling Code*. New connectivity between IBT systems and announcement systems could help expedite getting the message to occupants.

Distributed antenna systems may need an upgrade to fully support coverage for first responder communications as well as various wireless carriers. And Wi-Fi, the life-support system for modern society, must be robust and resilient.

## 2. *Then, start your IBT strategy with beacons and sensors.*

Devices to track occupants have a variety of uses. Alerts may be sent to smartphones using vibration to warn when proximity is too close, or when an appropriate setpoint, such as a gathering of more than 10 people, is identified. Furthermore, if someone is identified for coronavirus or other diseases, immediate alerts may be sent to anyone who has been in proximity to the infected person so that they may seek testing. Of course, extensions of this idea may cause concerns over privacy and cybersecurity that will need to be addressed.

## 3. *Use smartphones and other personal devices to minimize human interaction and identify potential issues.*

Personal devices such as smart watches and fitness bands are monitoring body temperature. Kinsa uses crowdsourced body-temperature tracking to detect potential concentrations of infected people. A Carnegie-Mellon University project uses voice recognition to identify voice signatures that are characteristic of people with COVID-19. This approach is based on crowdsourced input that could become more accurate over time. Occupant voices within buildings could be monitored for such signatures by deploying microphones throughout the building, as is done with gunshot detection systems, or via dedicated test stations.

Simple smartphone app ideas include ordering from “grab and go” cafes with trusted virus protection schema and dedicated rideshare pickup/drop-off locations with infection testing stations. (This also leads the transition to deploying more autonomous vehicles.)

## 4. *But, avoid an overreliance on smartphone apps and personal devices.*

Not all building occupants will choose to par-

ticipate with your new apps. Guests, technology curmudgeons, and the contrarians (you don't have any of those on your campus, do you?) will also need to be supported. Consider touch-free kiosks and digital signage displays as supplements that could satisfy some of the communications needs for people not participating in the "app program."

**5. Explore new networked versions of existing devices, such as thermostats, fire extinguisher charge indicators, and water-purifier filter status reminders.** New devices could include hand sanitizer and antibiotic soap dispensers with fluid-level alerts, breathing masks and other personal protective equipment (PPE) dispensers, localized air purifiers, virus test stations, and others. Start with a small proof-of-concept project, and if successful, move quickly to implement these devices across campus.

**6. Evaluate your mix of learning spaces.**

Even if this pandemic is the last one in our lifetimes, the importance of incorporating effective online learning programs should satisfy even the staunchest skeptic. All campuses will benefit from a thoughtfully balanced mix of classrooms that includes group learning spaces and audio/video production studios that support online teaching and the production of online instructional materials.

**7. Implement voice-activated strategies to replace touchpoints for common interfaces.**

Voice-activated, touch-free devices should be considered wherever possible. This could include doorknobs and strikes, elevator buttons, intercoms, and many other common interfaces. Many people may choose to be alone in elevators and may wish to have indicators that elevator cabs are empty.

**8. Upgrade restrooms to minimize infection possibilities.** Restrooms will require specific attention, as precautions will be needed ensure occupant confidence. Build apps and digital signage with data indicating when restrooms were last cleaned, which stalls are available, occupancy, etc. And, prepare for a future of individual restrooms on campus.

**9. Upgrade building entrances to incorporate wellness testing stations.**


Entrances will be particularly important as the gateways for infection and may be equipped with disease detection systems. These may be automated with temperature, blood-sampling, or other appropriate technologies, or with new types of personnel stations staffed by trained testers.

**10. Design occupant commissioning plans to inform and educate building occupants.**

Of course, our building occupants will need some training and encouragement/enforcement for the mitigations to work properly. Occupant commissioning (OCx) plans should be created to ensure that all permanent and temporary occupants become willing partners in ensuring healthy practices for themselves and others. As many campuses learned through years of experience with the Leadership in Energy and Environmental Design (LEED) program, a lack of occupant "buy-in" can lead to abandonment or "gaming" of the system, resulting in reduced advantages of the investment.

## WHERE TO START?

We believe that campuses will benefit by including infrastructure (at least) for intelligent building technologies for any building currently in design. A successful approach to planning begins with a new team member, the IBT PM (intelligent building technology project manager), following applicable standards such as ANSI-TIA 4994 ("Standard for Sustainable Information Communications Technology") and ANSI/BICSI 007-2017 ("Information Communication Technology Design and Implementation Practices for Intelligent Buildings and Premises"). An IBT PM following these standards can deliver design packages that reside in Construction Specifications Institute (CSI) Division 25: *Integrated Automation*.

We can learn from Marshall McLuhan's observation, "Our Age of Anxiety is, in great part, the result of trying to do today's job with yesterday's tools and yesterday's concepts." Proactively planning for returning to our campuses while we wait for the coronavirus lockdown to end will make our transition to the post-coronavirus era smoother, less anxious, and more successful. 

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

**T**here is usually a bit of luck when it comes to the timing of some of the books I have found to review. This month I have two very timely books for consideration. The COVID-19 pandemic has upended the way we think about buildings and the involvement of facility officers in the normal operation of any organization. The two books presented in this issue should have some immediate relevance, even if you can't implement everything they recommend right now. I encourage you to find the time to read them.

### THE ART OF BEING INDISPENSABLE AT WORK: WIN INFLUENCE, BEAT OVERCOMMITMENT, AND GET THE RIGHT THINGS DONE

Bruce Tulgan, Harvard Business Review Press, 2020, 163 pp., hardcover (\$20), Kindle (\$15).

A good person is hard to find but a good person is not necessarily the best person. Many good people remain good and don't become the best they can be, because they may not realize how to move to a position of greatness. In *The Art of Being Indispensable at Work*, Bruce Tulgan shares the advice he gives to those who are trying to become not only better, but indispensable in their workplace.

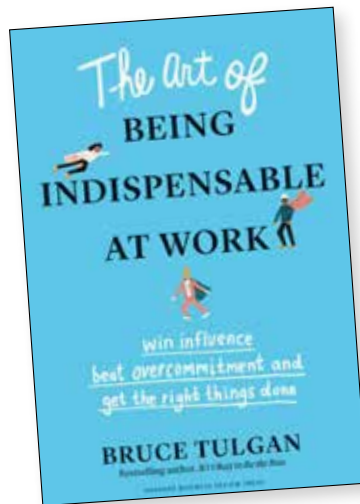
Being indispensable doesn't mean doing everything—that's a sure-fire way to end up getting overwhelmed, overcommitted, and overconfident. These situations result in losing value for the organization because your work becomes sloppy, late, or inaccurate. What's a good person supposed to do? Tulgan spells out the solution in eight easy-to-read chapters. Five of these chapters describe the action steps needed, while the other chapters provide the motivation and summary.

*Being Indispensable* deals with the intersection of two groups: The first group comprises your boss and your subordinates; the second group is your peers. Both groups must be managed in a way that respects position but also creates opportunities. Like other self-improvement publications do, this book stresses the necessity of aligning oneself with others in the workplace. There are technical ways to do this through strategic planning processes, but accomplishing this at a personal level requires managing

personality factors. There are other books that cover how to manage one's boss; this book focuses on feedback rather than influence—the influence is derived from the feedback.

Controlling what one works on is another important factor in becoming your best. Too many good workers reply with "yes, I'll do it," when they are already busy or not the best person for the task, just because they think being available to do more work increases their value in the organization. They're frequently wrong. In order to avoid getting into this trap—and to become indispensable—it's essential to learn how to say "no." Similarly, saying "yes" requires some thought and finesse.

The ability to delegate work intelligently is another important characteristic of indispensable employees. Identifying others—or developing others—who can get work done is essential. Developing a plan that results in completing a task rather than having it "almost" completed increases indispensability. Finally, developing one's ability to collaborate with others improves the work environment and increases opportunities for others to contribute, in turn increasing productivity. Many of these characteristics are addressed conceptually in Stephen Covey's *7 Habits of Highly Effective People* and in Robert Fulghum's *All I Really Needed to Know I Learned in Kindergarten*.





## HEALTHY BUILDINGS: HOW INDOOR SPACES DRIVE PERFORMANCE AND PRODUCTIVITY

Joseph G. Allen and John D. Macomber, Harvard University Press, 2020, 278 pp., hardcover and e-book (\$35).

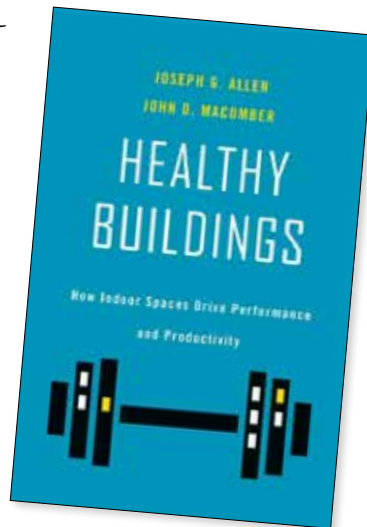
Facility officers recognize the inherent value of having well-maintained buildings to serve their constituents, but don't always have enough skills to make the arguments for keeping them that way or to tackle their maintenance problems without appearing to be doing capital renewal for renewal's sake. *Healthy Buildings* provides much of the missing support.

Even though I firmly believe that education is not about buildings, but about the programs inside them, it's still necessary to recognize that little happens outside the buildings. The U.S. Environmental Protection Agency says that humans spend 90 percent of their time in buildings. The benefits of fresh air, sunshine, and the natural environment we enjoy when outside are thus crammed into the other 10 percent unless something else happens.

That's where *Healthy Buildings* comes in. Many mistakes were made in building design in the 1980s in response to the need for energy conservation. Changes in building codes since then have identified many necessary corrections, but the supporting rationale and business arguments for those corrections are not well described in the codes. Our measurements of building efficiency and effectiveness fall into typical engineering measures, operating cost per square foot, return on investment, and so on. These measures frequently omit the human factors that need to be accounted for.

The facility management business is about serving the demand organization and responding to the productivity and performance expectations the organization has for the people working in the facilities. Other than techniques for managing people, which are limited to the facilities staff, facility managers seldom understand how to leverage their position to provide a better working environment for the people inside the buildings.

Written from a public health and business perspective, *Healthy Buildings* helps make the argument for improving the workspace. It also helps one develop the measures for healthier buildings. Although



they are a little perfunctory, the authors describe an HPI (health performance indicator), rather than the more familiar KPI (key performance indicator). Measurement is essential, and using a more meaningful measure to catch the attention of stakeholders, or convey a message, is valuable. Also needed are the basic metrics that feed into an HPI; the authors also describe the factors that provide the foundation for conveying the message you want to get across.

As a member of an ISO (International Organization for Standardization) facilities management committee looking at a standard to influence behaviors of people in buildings, I see a direct tie between *Healthy Buildings* and ISO 41001 ("Facility Management – Management Systems – Requirements with Guidance For Use"). Similarly, as I watch facility organizations battle with COVID-19 and demands to make facilities available while reducing vectors for disease transmission, I find the publication of this book to be extremely fortuitous. ☺

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# new products

Compiled by Gerry Van Treeck



**THE SLIDING DOOR COMPANY**, a manufacturer of contemporary space solutions, fabricates glass and aluminum room dividers, closet doors, and office enclosures in their factory. If you work from home, you need a dedicated workspace. Rather than tucking a desk into the corner of the bedroom and calling it your office, section off part of the room into a well-defined work area. Custom room dividers with versatile designs allow you to partition space in many configurations without sacrificing natural light or the aesthetics of the space. For additional detailed information on The Sliding Door Company visit [www.slidingdoorco.com](http://www.slidingdoorco.com).

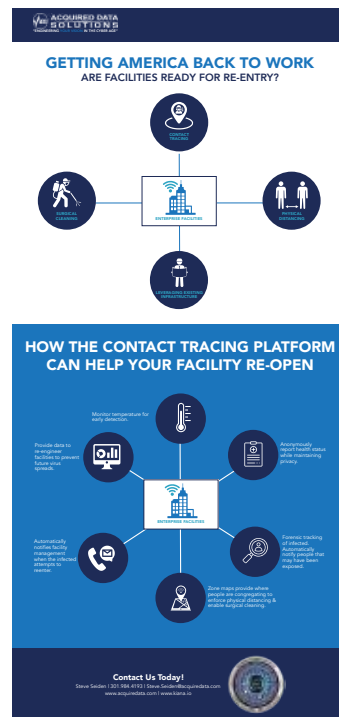


**STAYDRY SHOWER SYSTEMS** offers Extra Long Shower Rings—keeping your bathroom floors clean, dry, and safe. Need a longer shower curtain? Shower rod placed too high? Consider this alternative that saves both time and money, and use StayDry Shower Systems' extra long shower rings. These rings come in two styles and can add 3 in.-8.5 in. to any shower curtain. Rings are simple to assemble (push and twist)

and are designed to work on either 1.0-in. or 1.25-in. diameter shower rods. For more information on StayDry Shower Systems visit [www.StayDrySystems.com](http://www.StayDrySystems.com).

## ACQUIRED DATA SOLUTIONS,

a technology and engineering solution provider, and Kiana Analytics (Kiana), an analytics company, are now offering the ADS/Kiana Contact Tracing Platform to locate and surveil people in buildings who may have come into close contact with those possibly infected with COVID-19. The platform features zone maps that show where people congregate, enabling surgical cleaning, and automatically notifies facility management and provides actionable data to reengineer facilities to prevent future virus spreads. For additional information visit [www.acquiredata.com](http://www.acquiredata.com).



**KEMPER SYSTEM AMERICA, INC.** launches the Kemperol 2K-FR color series for commercial and low-slope roof designers who want the long-term protection of a cold liquid-applied, fully-reinforced membrane system but need an alternative to a white roof. While white roofs are generally preferred where they can help reduce building cooling requirements, and may be required in some locales, their high reflectivity can cause heavy glare on floors immediately above and contribute to heat buildup and higher AC costs. An accent color may also be preferred for aesthetics on roofs visible from the ground. The new color series



is an odor-free polyurethane (PUR) resin membrane system that is tinted throughout and color formulated to resist fading. Because there is no need to apply a separate topcoat over a membrane, the one-step application reduces labor and installation costs. To learn more, contact Kemper System at [www.kempersystem.net](http://www.kempersystem.net).



**HONEYWELL** announces a new temperature monitoring solution incorporating advanced, infrared imaging technology and artificial intelligence algorithms to conduct noninvasive, preliminary screening of personnel entering a facility. Honeywell's ThermoRebellion system uses thermal cameras and artificial intelligence (AI) to detect elevated body temperature and can validate if an individual is wearing proper personal protective equipment (PPE). The system can be rapidly deployed at the entryway of a commercial building, stadium, or other structure to quickly and efficiently identify whether personnel exhibit an elevated facial temperature. As individuals pass in front of a high-resolution, thermal imaging camera, their skin temperature is automatically detected within two seconds and displayed on an accompanying monitor. This can alert a person with an elevated temperature to seek additional screening. In addition, operators gain reliable, real-time information about personnel entering their facilities, helping them keep their premises safe and secure. For more information, contact Honeywell at [www.honeywell.com](http://www.honeywell.com).

**NANOTOUCH MATERIALS**, a provider of self-cleaning surfaces for facilities, has released their new NanoSeptic continuously self-cleaning sleeves for door handles. These types of door handles are mandated for interior doors in most commercial and public facilities as part of the ADA (Americans



with Disabilities Act). NanoSeptic peel-and-stick skins have been a staple in self-cleaning surfaces for facilities, turning push bars, pull handles, and other high-traffic touchpoints into continuously self-cleaning surfaces. Thanks to these new sleeves, the number of touchpoints in a facility that can be self-cleaning has been greatly expanded. For detailed information please visit NanoTouch Materials at [www.nanoseptic.com](http://www.nanoseptic.com).

**QUEEN MATS'** social-distancing floor mats encourage people to stand 6 ft. apart to keep

students and staff safer. They're ideal for use in entrances, lobbies, and near checkouts. These social-distancing mats

can be attached to any smooth, clean floor and are ideal for use in any location. They have a textured surface designed to prevent slipping. Use these mats to reinforce the "new-normal" hygiene required to stop COVID-19 and other infections. For additional information on Queen Mats visit [www.queenmats.com](http://www.queenmats.com).



**RIPCLEAR**, makers of advanced protective film for outdoor sports eyewear, announces the launch of their V2 Shield, designed to protect personnel battling the COVID-19 outbreak,



including emergency medical services (EMS) workers, nurses, police, facility and operations personnel, and other frontline staff. They expertly designed the V2 Shield with 91% optical transparency, so personnel can do their work safely and effectively while staying protected via a certified medical face shield. Each shield measures 32 cm x 22 cm

and is 0.3 mm in thickness. The face shields are conveniently stackable and travel easily. The V2 Shield has received medical device certification from the FDA and a CE (European Conformity) certificate of compliance as well as ISO 9001 quality management system certification. For additional information visit Ripclear at [www.ripclear.com](http://www.ripclear.com).





**BASIC SOLUTIONS** is a long-established U.S. company located in Los Angeles. Now more than ever, in this time of public concern regarding infectious disease, simple answers for safety are needed. Basic Solutions introduces a series of hand sanitizers and automatic, touch-free sanitizer dispensers. Individuals, educational facilities, small businesses, and local governments alike have been using our products for health and safety—we invite you to do the same. For additional information visit [www.basicsolutions.us](http://www.basicsolutions.us).



**ZELLO** is a provider of push-to-talk, live-voice solutions (connecting 140 million users globally) that increase communication and collaboration in businesses. The COVID-19 pandemic has us working from home in record numbers. In this “new normal,” it’s vital for teams to maintain accountability, inspiration, and personal connection. Indeed, distance and digitization of communications can pose a challenge to the relationships upon which great work relies. Emails can be misinterpreted, virtual meetings can feel stressful or strange, and the blurring of private home life and public work life can impact employee well-being. Zello provides the solution. For additional information about Zello visit <https://zello.com>.

**ECORE**, a manufacturer of safe, ergonomic, and acoustic performance surfaces for commercial and athletic markets, announces its partnership with Rochester Midland Corporation, a 130-year-old, family-owned, specialty U.S. chemical

manufacturer. Through this partnership, Ecore will distribute Enviro Care Neutral Disinfectant into the sports, fitness, and recreation markets. Enviro Care is an approved disinfectant under the U.S. Environmental Protection Agency’s Emerging Viral Pathogen Guidance in response to COVID-19 and other viruses. In addition to flooring, Enviro Care can be used to disinfect all surfaces, including equipment, countertops, and walls. For additional information visit [www.ecoreathletic.com/Products/Accessories](http://www.ecoreathletic.com/Products/Accessories).



**WORKWELL** is an ecosystem of prefabricated components designed to allow employers, schools, venues, airports, and public spaces to efficiently screen large groups of entrants for signs of infectious disease. The centerpiece of WorkWell is the entry pavilion, installed in any area where a controlled checkpoint is needed. Individuals are quickly checked for fever and potentially screened for other health risk factors. The pavilion is designed for touchless operation and includes air-handling systems capable of controlling the transfer of airborne pathogens. WorkWell modules are designed for plug-and-play implementation in a variety of colors, lighting, and branding options. These aesthetically appealing units are designed to integrate seamlessly with existing facilities and provide an inviting first impression for visitors. For additional information on WorkWell solutions visit <https://leoadaly.com/wp-content/uploads/WorkWell-Rapid-entry-modifications.pdf>. ⑤

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](mailto:gvtgvt@earthlink.net).

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