

# FMJ



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**ABOUT IFMA** IFMA is the world's largest and most widely recognized international association for facility management professionals, supporting 24,000 members in 104 countries. This diverse membership participates in focused component groups equipped to address their unique situations by region (133 chapters), industry (15 councils) and areas of interest (six communities). Together they manage more than 78 billion square feet of property and annually purchase more than US\$526 billion in products and services. Formed in 1980, IFMA certifies professionals in facility management, conducts research, provides educational programs and produces World Workplace, the world's largest series of facility management conferences and expositions. To join and follow IFMA's social media outlets online, visit the association's LinkedIn, Twitter, Facebook, YouTube and Flickr pages. For more information, visit the IFMA press room or [www.ifma.org](http://www.ifma.org).

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# Service has a new name: Rick

When Rick and his team returned to their Class A Boston office tower after a long weekend, they anticipated high July temperatures. What they didn't expect was simultaneous chiller mechanical and control failures. With only one 650-ton chiller available to cool 33 floors, the entire engineering team mobilized to test, repair, and restore the system. Teamwork and communication across Rick's team of electricians, HVAC technicians, plumbers, and managers—many who worked through the night—meant the building was ready for its scheduled 4 AM cool-down, and ready for business. When the heat is on, cool heads prevail.

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## ON THE GO?

FMJ can be viewed on your mobile device, so you can get your FM content fix anywhere, anytime.

### FMJ Extras

The online version of FMJ features extra resources like videos, podcasts, white papers and more to enhance your reading experience. Click on the FMJ Extra icons that appear in the digital magazine to link to additional sources of information to learn more about topics covered by articles in this issue.

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### FMJ Extended

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### FROM LAST ISSUE

The **March/April 2018** issue of FMJ had a theme of **Owning O&M**. Our most-read article was on the new recycling ban in the People's Republic of China that has created ripple waves around the world. Read **Reduce, Reuse, Responsible Recycle** now at <http://bit.ly/0318recycle>.

### READER FEEDBACK

"I absolutely love IFMA Engage and the variety of queries and comments from such a diverse group! I look forward to seeing what is going on in the FM world."

— Judy Saylor

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## Editor's Note Jocelyn Kerr

This year marks the 30<sup>th</sup> anniversary of FMJ magazine. Our next issue will feature highlights from the past 30 years and we hope you'll stop by the expo floor at World Workplace Charlotte to say hello and help celebrate our milestone.

As we look back, we also look forward. We want to thank you for your readership, your contributions and your feedback over the years. One of my favorite parts about editing FMJ is working with member contributors to develop article ideas and to help our contributors craft content that helps each FM learn more about the industry and ways to create more efficient, productive facilities.

To that end, the articles in this issue are all about "Managing 21<sup>st</sup> Century Spaces." This issue has a special podcast tie-in – past-chair Bill O'Neill interviewed author and global consultant Jeremy Rifkin for the latest episode of FM Unscripted. Mr. Rifkin was a keynote speaker at World Workplace Houston last October and writes extensively on the connection between technology, specifically the Internet of Things, energy and the global economy. An overview of their interview and a link to the podcast are available on Page 17.

Unfortunately, an increasingly important element of managing modern facilities is the need for an active shooter response policy. On Page 20, our partners at FMLink have compiled a list of resources and tips for developing a plan as well as the latest statistics on active shooter dangers.

Managing smart buildings is another hot topic as we settle into this century. We have a look at smart buildings starting on Page 62, and there's a handy guide to the latest solar energy storage technologies on Page 70.

Of course, the people element can't be forgotten. This issue we have an in-depth look at how design for the aging population has changed and continues to evolve as more research is done into how people interact with the built environment. This is a companion piece to our designing for disabilities story in last issue's Extended section. If you didn't get a chance to read that piece, a link is available on Page 48.

On a personal note, as the magazine turns 30, I also celebrate my first anniversary with IFMA. Although I had covered the convention industry and architectural news in my previous life as a journalist, it wasn't until I began at FMJ that I fully appreciated all the hard work and effort that goes into facility management. As IFMA continues to position itself as a premier global association for the industry, I'm excited to continue developing useful, actionable content for FMJ readers. As always, please reach out with ideas and feedback!

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**GRAHAM  
TIER**

CFM

*Chair, Board of  
Directors*

# From the **Chair**

I am honored to serve you as the IFMA Global Chair 2018-2019 together with a group of outstanding professionals from the United States and around the world who make up the IFMA Global Board of Directors. I am confident with this team that we will provide excellent insight and sound direction as we move forward.

As the global leader in facility management, with over 24,000 members worldwide, we are the largest and most influential professional FM body in the industry, and we will continue to keep the association relevant and at the forefront of workplace and digital evolution.

We have an exciting year ahead as we continue to drive our strategic plan toward 2021. Our vision has been consistent and bold – to make FM a career of choice and addressing the FM industry fragmentation. Apart from our core business activities we will continue to focus on the following strategic priorities:

- Establish global alliances
- Change management to address the “always on” transformation we are all experiencing
- Continue to evolve our educational offerings and IFMA knowledge hub
- Evolve the Building Environment & Technology Association (BETA)

Surrounding ourselves with high-value talent makes a world of difference in all aspects of business and decision making; however, we need a team who can implement that direction. The staff and management at the association are key to our success in keeping IFMA great as we work together to meet the needs of

members, stakeholders and supporters. With the office restructuring complete we look forward to a successful year ahead in the new environment.

With over 600 IFMA members in the UK, I want to wish the team well as they launch the UK chapter, which is another amazing milestone for the association and is only possible with the strong support of our friends at RICS.

Our three regional boards continue to provide important insight and value to our development, progress and success. In addition, both Europe and Asia now have excellent local leadership in place working with the chapters and building the brand with training, events and conferences.

I am looking forward to seeing you all at World Workplace 2018 in Charlotte, which is a very important time for us as we come together and show the strength of our association, and to learn from the various education tracks and industry suppliers on the latest technologies, product and services. I would encourage you to register early to help us with the planning and logistics.

Thank you to our members and supporters for their continued loyalty to IFMA, and I would also like to take this opportunity to thank those outgoing board members for their dedication and service to the profession.

See you at World Workplace Charlotte, the home of NASCAR, as we drive our profession to new levels over the next year.

Best regards,

*Graham* 田國恆



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\*According to the IFMA sponsored research report, "Evaluating the Value: International Facility Management Association (IFMA) Facility Management Credentials"

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**WILLIAM M.  
O'NEILL**  
CFM

# Moving Forward **IFMA**

This year has been a landmark year for IFMA. The Executive Committee and the IFMA Global Board of Directors have taken substantial steps to move our association forward. We are replacing the association leadership to position IFMA in a new light with leaders who will infuse our association with new ideas, capabilities and connections. Our members must be ready for the changes ahead and we will provide this through continued collaboration, partnering and sharing with others in the built environment. This will touch all key areas in support of our members' professional development: education, credential/certificates, events and technology.

As I look back on the areas that moved IFMA forward, three areas come to mind:

- The composition of this year's IFMA Global Board of Directors challenged the association to think and act beyond what were familiar areas of delivery and engagement in the FM space.
- We continued to evolve the IFMA/RICS collaboration, co-hosting multiple global events that contributed to the co-mingling and co-sponsoring of global events. As with any healthy interactions with professional partners, it taught us many lessons to successfully engage with our members.
- The value of the IFMA Workplace Evolutionaries, known as WE, has helped establish the importance of workplace, wellness and health within the FM space. As our incoming chair, Graham Tier has stated, "When you think workplace, you think IFMA."

These are a few of the valuable areas that IFMA has progressed and evolved in this last year.

In addition, I think of the Appreciative Inquiry process that IFMA members participated in from August through October 2017. The four aspirational statements that were outcomes of this process were:

- Sharpening FM skills
- Providing an exceptional membership experience
- Broadening and globally advancing the profession and
- Evolving FM and its member-centric association

These statements helped guide the board's strategic focus and considerations during the Board Strategic Planning session in January 2018. This is a valuable method to stay engaged with members.

There are many other areas that the association is and will continue to be involved in next fiscal year and beyond. I am particularly thankful for the tireless commitment of the IFMA staff throughout this challenging year. Their efforts and dedication to the IFMA cause is remarkable. Thank you all. I also am fortunate to have had a solid Executive Committee and Board that continues to guide the strategy of IFMA. Thank you all. Last, but not least, thank you members for all you do to contribute to the facility management profession. We could not do this work without your insights, opinions and contributions.

And lastly, IFMA is in good hands and ready to move forward to our future.

Sincerely,

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# NFPA RELEASES THE WORLD'S FIRST ACTIVE SHOOTER/HOSTILE EVENT STANDARD

*“The proactive, integrated strategies recommended and defined in NFPA 3000 will go a long way in helping communities plan, respond and recover from active shooter and hostile events.”*

**- Jim Pauley, NFPA President and CEO**

All NFPA codes and standards can be viewed online for free at [www.nfpa.org/freeaccess](http://www.nfpa.org/freeaccess)

Developed with insight from law enforcement, fire and emergency medical services, hospitals, private security, the U.S. Department of Homeland Security, the U.S. Federal Bureau of Investigation and others, the NFPA 3000™ (PS), Standard for an Active Shooter/Hostile Event Response (ASHER) Program released this May by the National Fire Protection Association (NFPA) is the first of its kind, providing unified planning, response and recovery guidance, as well as civilian and responder safety considerations.

After the 2016 Pulse Nightclub massacre in Orlando, Florida, USA, NFPA was asked to develop a standard to help authorities come together and create a well-defined, cohesive plan that works to minimize harm and maximize resiliency. NFPA established a Technical Committee on Cross-functional Emergency Preparedness and Response. In mid-April, NFPA 3000 was issued by the NFPA Standards Council, making it the first consensus document related to active shooter and hostile events. This marks only the second time in NFPA's 122-year history that they have issued a provisional standard.

In addition to offering NFPA 3000 via a new digital subscription – which will be updated automatically when the next edition becomes available – NFPA is offering an online training series, a downloadable checklist, a readiness assessment document, and a fact sheet for authorities to learn more about establishing a proactive, collaborative active shooter/hostile event program.

## CarMa helps service providers deliver more sustainable facility services

The Institute for Applied Research (IFAF) Berlin in Germany, promotes science and applied research by supporting the cooperation of Berlin universities of applied sciences participating in IFAF. As of April 2018, IFAF Berlin is funding for two years the cooperative research project “CarMa – Carbon Management for Facility Services” of the two universities of applied sciences, HWR Berlin and HTW Berlin.

Under the direction of Prof. Dr. Andrea Pelzeter (HWR) and Prof. Dr. habil. Michael May (HTW), a carbon management method and an associated technology will be developed to capture, monitor and benchmark CO<sub>2</sub> emissions generated by facility services.



*Prof. Andrea Pelzeter and Prof. Michael May presented the CarMa project at INservFM 2018 in Frankfurt, Germany.*

With the help of CarMa, FM service providers will be able to identify which activities in their value chain contribute to CO<sub>2</sub> emissions. The CarMa IT tool should also provide benchmark results and recommendations on the reduction of emissions. The associated software will be developed as a web service, publicly available as part of a business model. In a pilot phase CarMa will be integrated with selected IWMS systems in order to enhance their capability in the field of sustainability.

The new method will be published as a GEFMA Guideline.

### UPCOMING EVENTS

#### Advocacy Day and Public Policy Forum 2018

Sept. 12-13 | Washington, D.C., USA

[ifma.org/events/fm-events/advocacy-day](http://ifma.org/events/fm-events/advocacy-day)

#### World Workplace China 2018 Conference and Expo

Sept. 13-14 | Beijing, China  
[http://bit.ly/wwchina\\_2018](http://bit.ly/wwchina_2018)

#### World Workplace 2018 Conference and Expo

Oct. 3-5 | Charlotte, North Carolina, USA  
[worldworkplace.ifma.org](http://worldworkplace.ifma.org)

## EU survey of senior retailers reveals UK is less prepared for GDPR compliance than Germany or France

U.K. retailers are not only lagging behind Germany and France in the race to General Data Protection Regulation (GDPR) compliance, they are also more likely to view data transfer as a significant threat to their organization. This is according to an Oliver Wyman survey of 277 senior retail executives in the U.K., France and Germany, designed to explore the risks and opportunities associated with GDPR, which came into effect on May 25.

Almost half (46 percent) of the U.K. survey respondents acknowledge that their organization will not be fully compliant (compared to 32 percent and 39 percent in Germany and France). Seventy-one percent see data transfer requests as a significant threat (compared to 65 percent in Germany and 56 percent in France).

On average, the survey shows that organizations are devoting 10 employees, including six new hires, to GDPR in an effort to ensure compliance. Fifty-six percent of executives say their companies are introducing stronger data security measures to increase customer's trust, and 40 percent are exploring price and service incentives for customers who don't request that their data is deleted or transferred.

"Unless GDPR leads to a significant shift in consciousness around data privacy, retailers will have spent a significant amount of time and effort building offensive and defensive strategies for minimal benefit," said Duncan Brewer, Retail and Consumer Goods partner at Oliver Wyman.

## ISSA AND NORMI JOIN FORCES TO BETTER SERVE MEMBERS

ISSA, the worldwide cleaning industry association, has entered an alliance with the National Organization of Remediators and Mold Inspectors (NORMI) to undertake initiatives that leverage the expertise of both organizations for the mutual benefit of their respective member bases.

ISSA offers education, training and certifications under its Cleaning Management Institute (CMI) brand, carefully curated for cleaning industry professionals. Having trained thousands of IAQ/mold professionals throughout the United States, Canada, Asia and South America, NORMI has an extensive training and certification program, and is an approved training provider for states that require licensure in the mold profession.

ISSA and NORMI will periodically conduct education, training and certification programs that will be co-branded under NORMI and CMI.

Visit [www.issa.com/events](http://www.issa.com/events)

## "Green" building certifications on the rise in major international markets

Major metropolitan office markets around the world are seeing a significant increase in the adoption of green building certification programs, according to the inaugural "International Green Building Adoption Index (IGBAI)," a study by CBRE and The Netherlands' Maastricht University. The study reports that 18.6 percent of space in 10 markets across Australia, Canada and Europe is now certified green, versus just 6.4 percent in 2007.

Canadian cities set the pace, with 51.6 percent of the space in Vancouver and 51.0 percent in Toronto holding green certifications. This is particularly notable for Vancouver, as the city has a formal initiative and action plan toward becoming the greenest city in the world by 2020.

Increased demand for more environmentally responsible buildings from governments, corporate tenants and institutional investors has been particularly evident in cities where green properties made up virtually no part of the office market just a few years ago. For instance, the Australian cities of Sydney and Melbourne, third and fourth in the index, saw their green office square footage increase from less than one percent in 2006, to more than 46 and 28.8 percent, respectively.

Paris, the largest market in the study, saw green building certifications increase from 0.1 percent in 2007, to 9.1 percent in 2017; while the second largest market, London, went from 0.2 percent in 2010, to 8.7 percent in 2017.

For insights into the 10 international markets studied, as well as the various green building certification programs tracked, download the full report at <http://bit.ly/2MYp3kD>

## STUDIES OUTLINE WHAT WORKERS WANT IN BENEFIT PROGRAMS; STRESS IMPORTANCE OF MEASUREMENT

Download the Incentive Research Foundation's "Award Program Value and Evidence" and "Establishing the Intangible, Non-financial Value of Awards Programs" white papers at [theirf.org/research](http://theirf.org/research).

Download Brandon Hall Group's "2018 Wellness and Well-Being Study" at [go.brandonhall.com/FMJWellness](http://go.brandonhall.com/FMJWellness).

Recent studies have shed some light on what today's workers, regardless of age, are seeking in retirement benefits, IRR (incentive, reward and recognition) and wellness programs and digital training. The primary takeaway from these findings is that without a system of measurement, employers can't understand or leverage program benefits.

### Retirement/pension benefits

The pension benefit may now be nearly as important to employees as their health care. Surveying 2,750 U.S. and Canadian workers and retirees with pension plans, Accenture found that 78 percent of respondents agreed that pension benefits are a major factor when deciding whether to accept a job; and 73 percent said they stay with their current employer due to pension benefits.

As 82 percent of respondents said they want more help with retirement planning, especially through digital channels (webinars, mobile apps), Accenture recommends leveraging digital offerings to meet the demand from potential recruits and current workers.

### Incentive, reward, recognition

IRR programs result in an average 22 percent gain in employee performance. To help businesses maximize the effectiveness of their IRR programs, the Incentive Research Foundation released "Award Program Value and Evidence," a summary of the advantages of non-cash rewards and an examination of how businesses are measuring program benefits.

The white paper provides an overview of

academic research that explains the psychology behind the effectiveness of non-cash rewards. For example, non-cash incentive programs are 50 to 150 percent more likely to be linked to employee retention, satisfaction and performance than cash-only incentive structures. Why? Their "trophy value" makes them highly visible, it's more socially acceptable to talk about merchandise or a trip than to brag about a cash incentive, and fun experiences can create lasting memories and positive associations.

### Wellness programs

According to Brandon Hall Group's "2018 Wellness and Well-Being Study," 70 percent of organizations offer an employee wellness/well-being program; but for a majority, less than half of their employees are involved.

The research raises the question of how organizations are benefiting from their wellness/well-being programs – 71 percent don't know the average per-employee cost reduction attributable to the program; and 82 percent don't know the average return on each dollar spent on wellness/well-being.

"Organizations clearly believe there is a benefit to offering wellness and well-being programs; but like everything else in human capital management, measurement is the key to understanding exactly what the benefits are," Brandon Hall Group CEO Mike Cooke said. "Organizations need to up their measurement game if they are going to prove to leadership that these programs are truly valuable and sustainable in the long-term."

## Workplace Week raises funds for New York City education program

Following a successful six years in the UK, Workplace Week 2018 landed in the U.S. on June 18. The event, which is run by Advanced Workplace Associates (AWA) and supported by the IFMA Workplace Evolutionaries Group, showcased workplace innovation and creativity, with all proceeds donated to the "I Have A Dream" Foundation – New York (IHDF-NY).

WeWork, Neuberger Berman, Delos, Nickelodeon and Viacom joined the week-long program, offering insight into how the real estate and facility world can link space, design and technology to drive a positive and productive workplace culture.

For more information on the event, visit [www.workplaceweek.com](http://www.workplaceweek.com).

To explore how FMs can boost productivity through being playful with space and creating bold change, please visit [www.advanced-workplace.com](http://www.advanced-workplace.com) to access AWA's latest research.



# IFMA SPOTLIGHT

## Back to the Buildings: A Conversation with Jeremy Rifkin and Bill O'Neill

At World Workplace Houston in 2017, author and political advisor Jeremy Rifkin sparked discussion among attendees about the future of energy and technology in relation to the built environment. His book, *The Zero Marginal Cost Society*, was made available at the conference and draws a connection between the rise of the Internet of Things and the development of an entirely new global economic model.

Rifkin is also the executive producer and narrator of a new film, *The Third Industrial Revolution: A Radical New Sharing Economy*, produced and distributed by VICE Media. As a global economic theorist and political advisor in the European Union and the Peoples Republic of China, Rifkin has used his knowledge and experience to theorize on the future of energy, the global economy and the intersection of the two with the built environment.

For the latest edition of the FM Unplugged podcast, IFMA Global Board of Directors Past-chair Bill O'Neill sat down with Rifkin to discuss his ideas about how the Internet of Things, energy changes and other technological advances will affect facility management.

In the interview, Rifkin addresses the nexus of the built environment — “it all comes back to the buildings” when it comes to energy usage, technological advances and how humans will interact with space and technology in the future as new global economic models are formed. He states capitalism is being eclipsed by a new technology-driven economy where entrepreneurship and market competition are driving productivity up while driving costs down.

Central to these changes are the facilities that house the people, organizations and manufacturing processes that are driving change. Facility managers are at the forefront of this wave of global change, and Rifkin outlines his vision of what that means to FMs and the global economy as a whole.



**BILL** Facility folks typically are needing a plan. They're the people that are present. They're the people that know the facilities, or the nodes, really well. So, the question I would ask you is, who needs to be brought into the discussion to create success moving these ideas forward? The things you talked about – the Internet of Things, the smart cities, the smart buildings – those are all vertical discussions that IFMA has had over the last ten years.



**JEREMY** That's the best question you could've asked after the framework because that's the most important [question]. It is pretty interesting, after the 17 years this has been in process, kind of developing this narrative and now the deployment plan since 2001 – it's not as if this magically came out of nowhere. It's taken the inputs of so many industries, so many institutions and so many individuals. But here's what we finally realized: This “third industrial revolution,” smart city, smart region, smart world infrastructure has to be deployed in a manner that is commensurate with the operational design of the infrastructure itself. If you look at the first and second revolution infrastructures ... they were designed to be centralized, top-down, proprietary, closed intellectual property [and] vertically integrated because that was the most efficient way to return the investment to shareholders.... The third industrial revolution infrastructure is so totally different it requires a different way to scale it.

Listen to the full interview now on IFMA's FM Unplugged podcast at [bit.ly/FMJ\\_Rifkin](http://bit.ly/FMJ_Rifkin)



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BY PETER KIMMEL

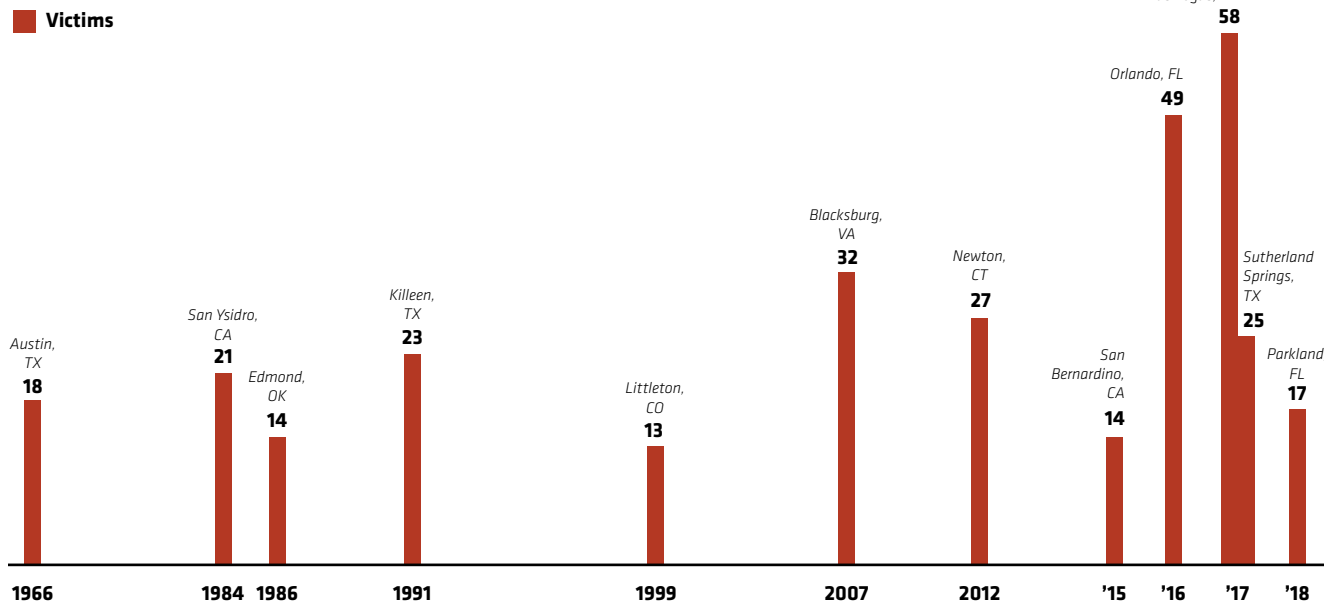
# Vigilant FM

## Prevention training against active shooters

In response to the recent tragic events in Parkland, Florida, and Santa Fe, Texas, FMJ's content partner FMLink has compiled this report on being better prepared for an active shooter situation. While the tragedy at Parkland was not the largest in U.S. history, it seemed to resonate with more people than many others, as if the time had come when people were compelled to take action.

And we must not forget the role of the facility manager in these events — a key figure to implement and oversee any plans for a specific facility. All the shootings took place in or from a facility, where someone with firearms entered a facility to begin a senseless killing rampage. Most facility managers have thought long and hard about what can be done to prevent such scenarios, but sometimes what needs to be done cannot be done, perhaps because of budget constraints, building constraints, staffing or other reasons.

### Deadliest Mass Shootings in the United States



FMJ EXTRA  
Resource

FMLink Active Shooter  
Resource Guide

Since 1982, the number of mass killings of eight or more people has increased dramatically. Since 2009, the number of people killed in mass shootings has also increased; four of the five mass shootings of 25 or more people have been since 2012, and the fifth one was in 2007. Clearly the problems have been escalating in recent years. Furthermore, the four used semi-automatic rifles, which clearly had an impact on the loss of life.



## Expert Resources

**Campus Safety Magazine** has identified 20 strategies to help reduce the threat and killings from an active shooter on campus settings. Most of these apply to any facility, not just educational facilities. Some of the topics covered include threat evaluation and management, visual weapons screening, anonymous reporting systems, crime prevention through environmental design, and proper background checks of employees and volunteers. Many of their identified strategies are simply awareness and training, so they are very affordable and feasible to implement. View Campus Safety Magazine's full list of recommendations with detailed descriptions of each strategy: <http://gcti.com/20-active-shooter-and-active-killer-prevention-strategies>.

If a shooter does enter a facility, what can be done during the attack to minimize the casualties? What can the facilities manager do to make sure the attack is contained as much as possible? Should there be frequent drills and training of key staff? Who should organize these efforts?

First, what can be done within a facility to reduce the chances that it will have an active shooter incident and to minimize the toll it takes, should there be a shooter who enters the facility? Preparation is particularly important because active shooter situations are often over within 10 to 15 minutes — long before help arrives.

Note that there are many recommendations from these sources that are not provided in this article. Readers should go to the links provided and fully research all the suggestions, passing suggestions along to the appropriate people in their organization.

Many FMs are aware of a good number of these recommendations. Some don't have the time available to make them happen; others can't get their management to make it a priority, whether for time or for budget. What happened in

Parkland should be a wake-up and call-to-action for facility managers. FMs will see that they can play a large role in keeping our facilities safe.

Preparation can save lives. Years ago, after many lives had been lost in fires, someone came up with the idea of scheduling regular fire drills, especially in certain types of facilities such as schools. As a result, many lives have been saved from fire.

The same concept works for active shooters. With the right preparation, many situations could be avoided completely. Certain personnel can be trained to recognize a potential situation, and all occupants of a facility can be shown how to take the appropriate course of action.

The facility manager is in a unique position of knowing the facility better than anyone else. The FM also knows what is feasible to do and can request approval for and secure whatever additional resources and equipment may be needed. The FM is also trained on how to assemble a variety of resources and have them work as one well-oiled machine. It is essential that the FM be pro-active.

Law enforcement groups do not recommend pulling fire alarms, as this causes more panic and brings people out into the hallways, which is where the shooter would like to see them.

The **Department of Homeland Security (DHS)** published an excellent 13-page booklet, *Active Shooter: How to Respond*. It includes specific responsibilities for the facility manager, including distributing critical items to appropriate managers/employees, assembling crisis kits (i.e., radios, floor plans, staff roster, first aid kits) and placing removable floor plans near entrances and exits for emergency responders. The booklet also states that evacuation instructions should address the needs of individuals with special needs and/or disabilities. While beneficial for FMs, it also includes valuable information for human resources and managers, such as a section on warning indicators from upset employees. DHS also provides a handy two-page *Active Shooter Pocket Card* that summarizes how to cope and respond in the event of an active shooter's presence in building. They also produced a video of how to respond to an active shooter, which can be found at [www.dhs.gov/options-consideration-active-shooter-preparedness-video](http://www.dhs.gov/options-consideration-active-shooter-preparedness-video). The video is nearly eight minutes long and would be useful to show all staff, including those who have special needs.

FMs should identify escape routes for each room and post them similar to fire evacuations. Active shooter drills can reinforce where to go and what to do.

Resources mentioned in this article can aid in developing a plan and training program for new and existing employees. An emergency action plan for FMs should include the following, but note that plans will vary depending on many factors, such as size of facility, number of occupants and their age, building and site constraints, and other variables. However, they should not be affected by availability of staff time or budget — human life is too precious for that.

**Observe changes in behavior and the facility.** Be on the lookout for anything different in terms of people's behavior and anything out of place in the facility, like items left in the hallways, furniture that has been moved, etc. As FMs regularly walk through the facility, they can play a key role in noticing changes.

**Assess the facility and its perimeter.** See what can be done to make the facility more secure within and around the building. Determine whether any additional security staff should be hired, or whether additional security equipment like cameras, keypads or sensors should be installed. Consider facility modifications, such as means of egress or ways to secure doors.

**Recognize potential shooter indicators.** Train staff to recognize indicators of a potential shooter.

**Develop procedures for and train key personnel.** Identify key personnel and staff who may need to take action should an active shooter enter the premises. Outline the actions they may need to take and develop procedures for all to follow. Include an initial training program during orientation of new employees and ensure all staff is trained for appropriate responses. Conduct regular drills and training ex-

ercises with mock active shooters so that everyone is prepared. Local law enforcement can be an excellent resource in designing training exercises.

**Develop procedures to admit visitors.** Develop policies and procedures to admit visitors to the facility, including delivery and service personnel. These encompass formal identification checks, a set screening requirement and a process for alerting security about expected visitors.

**Schedule an annual review.** Schedule an annual review of the plan and modify it as necessary.

Additionally, emergency preparedness includes training employees how to react in the event of an active shooter scenario. Recommendations from DHS (with guidelines from the New York Times and Washington Post) teach employees to run, hide or fight.

First, employees should note the two nearest exits in every facility. If in an office or room, stay there and secure the door (FMs should ensure meeting room doors can be secured from the inside). Stay out of the shooter's view and lock doors; silence cell phones and pagers. Rooms near the elevator core are ideal, especially if they can be barricaded, as these rooms often have load bearing walls that bullets cannot penetrate.

If running is an option, identify in advance escape routes. Leave belongings behind. If within sight of the shooter, run in zig-zag patterns while looking for cover. If on a higher floor, take the stairs, not the elevator; if on a lower floor, be prepared to jump through a window.

As a last resort, and only if your life is in danger, attempt to incapacitate the shooter. **FMI**

**Federal Emergency Management Agency (FEMA) has put together several courses about active shooters, many of which are available online through their Emergency Management Institute and the National Institute Management System (NIMS). For more information, go to <https://training.fema.gov/nims/> and search for "active shooter."**

**National Fire Protection Association (NFPA) is finalizing a new standard (NFPA 3000) for preparedness and response to active shooter and/or hostile events. Released this May, the standard is the first of its kind, providing unified planning, response and recovery guidance (read more on page 14 of Industry News). The purpose of the NFPA 3000 is to identify the minimum elements necessary for organizing, managing and sustaining an active shooter program to reduce the risks and impact of a shooting incident on an organization. A fact sheet on NFPA 3000 is available at [www.nfpa.org/3000](http://www.nfpa.org/3000).**

**The Washington Post has compiled an excellent five-page guide on what to do if a gunman opens fire in a building. It has very clear graphics and is appropriate to distribute to all building occupants as well as those running active shooter drills. The article is available at [www.washingtonpost.com/graphics/national/activeshooter/pdf/active-shooter-twp-update.pdf](http://www.washingtonpost.com/graphics/national/activeshooter/pdf/active-shooter-twp-update.pdf).**

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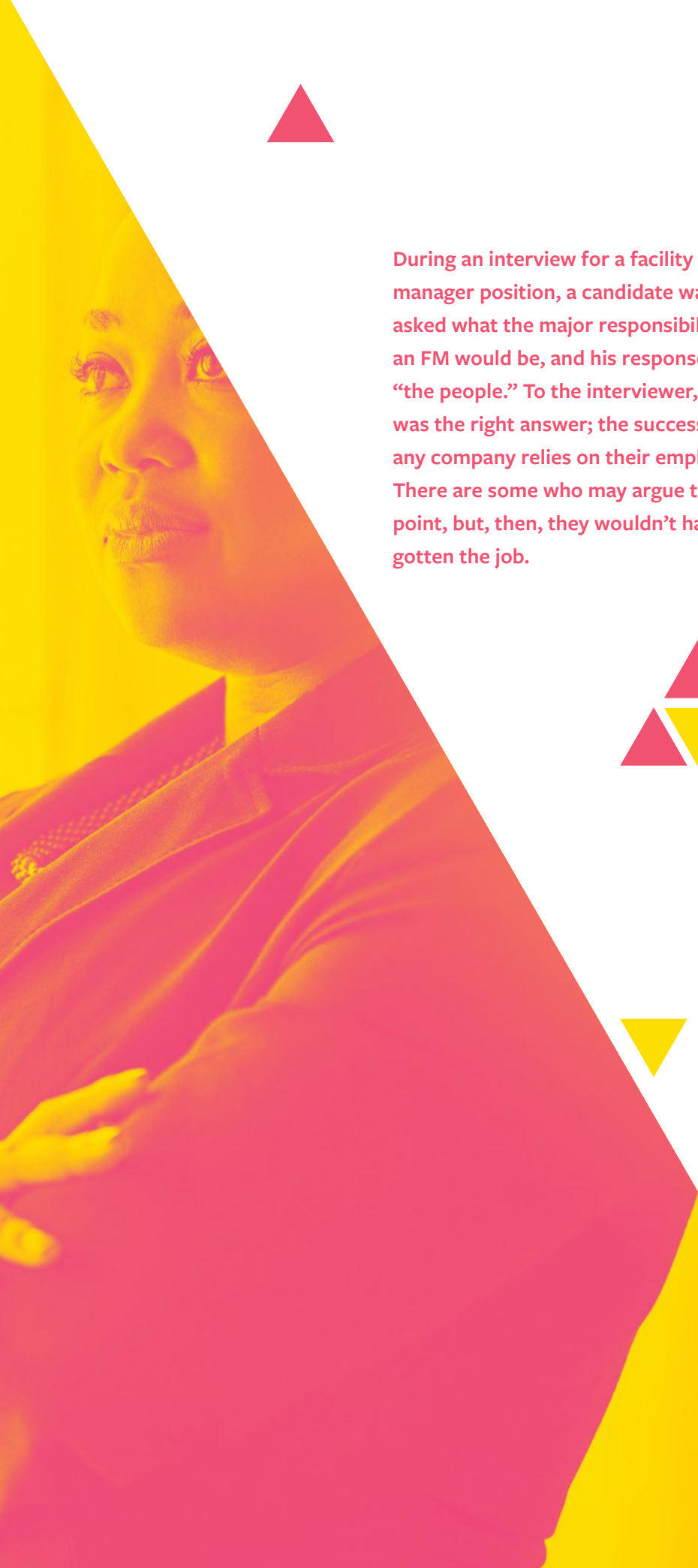
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# DOWN TO THE PEOPLE







During an interview for a facility manager position, a candidate was asked what the major responsibility for an FM would be, and his response was “the people.” To the interviewer, this was the right answer; the success of any company relies on their employees. There are some who may argue this point, but, then, they wouldn’t have gotten the job.

Employees have innate needs that need to be met to keep them going, day in and day out. Given that a large percentage of any week is spent in the workplace, making occupants happy and comfortable should be a prime initiative. How can FMs take the appropriate steps to continually and consistently enhance the employee experience?

Abraham Maslow came up with his hierarchy of needs to outline levels of personal growth. It might be an interesting exercise to tweak his pyramid a bit to better follow an occupant’s progression in a facility from basic needs to self-actualization. Facility managers can assist building occupants in this upward climb as it relates to quality of life in the workplace.

### *Little steps*

The first step is for FMs to decide that they are not going to be satisfied with the status quo. When it comes to continuous improvement in facility operations, there are a number of indicators that can be used to assess the current status of employee well-being as well as track any progress that has been made regarding new initiatives. One of the most important keys to understanding performance is based on feedback from the customers. More critical than that, though, is the need to make employees feel as if they are a part of the process.

This starts with communication. An FM should continually deliver messages to enhance visibility and awareness and connect people so that they feel as if they are part of a community. This will create common grounds upon which everyone can agree: for instance, equitable treatment applied to people, planet and profits. What better way to achieve those than through a focus on sustainability? In today’s world, sustainable actions provide the best results for customer comfort and satisfaction.

It is up to an FM to create awareness of these trends, raising the visibility of sustainable actions through constant communication.

Healthy, comfortable employees are often more satisfied and productive. Facility managers need to be aware of the value that increased employee productivity and health provides to a company. Salary expenses are a high proportion of the operational expenses of an organization, so even a small percentage gain in productivity, multiplied by the number of employees in the building, can result in considerable savings. Facilities should be managed with an appreciation of the importance of providing high-quality interior environments for all users.

Indoor Environmental Quality (IEQ) is a growing social, economic and environmental concern. It refers to the conditions inside a building, and there is evidence that poor IEQ leads to negative occupant perceptions and overall dissatisfaction with facilities. Physical and environmental factors, such as temperature, humidity, sound, lighting, contaminants and particulate matters strongly influence IEQ. The best way to find out what aspects of a facility are important to occupants is to implement an employee comfort survey and complaint response system to collect anonymous responses about conditions in the building and how to improve them.

Everyone sees things through a tunnel of their own making. It could be very narrow, or it could be quite wide, but people are limited in what they see and how they perceive it. Thus, having an FM determine the needs for all occupants in a building will never be satisfactory. Input from the people who work there should define operational parameters.

A comprehensive survey can include air quality, access to daylight and views, pleasant acoustic conditions, thermal comfort and occupant control over lighting, as well as green building features. It may also include functional aspects such as whether the layout provides easy access to tools and people, and whether there is sufficient space for occupants to perform their jobs. Facility managers can increase the satisfaction of building occupants by considering all aspects of IEQ. The penchant of some FMs to focus on temperature or air quality alone misses the mark of total comfort.

One effective structure for a good survey would be based on the Likert

Scale. This principle of measuring attitudes would ask people to respond to a series of statements regarding facility conditions. The survey can state standards around how a facility department manages the environment. It can ask the extent to which employees agree with these practices, which taps into the cognitive and affective components of attitudes. Likert Scales are designed so they do not request a simple yes or no answer. They allow for degrees of opinion, or even no opinion at all. Therefore, quantitative data is obtained, which means that the data can be analyzed with relative ease. Comments can also be collected — letting employees expand upon their answers and making them feel as if they are part of the process. Once survey results have been compiled, they should be reported back to the employees, comments and all. This could lead to further dialogue and better meeting the needs of the customer.

## Next steps

If an FM is content with the work they perform, they will stop taking little steps forward and begin taking big steps backward. Continuous improvement is incremental, happening little by little. Employee satisfaction does not equate to empowerment: it does not address employees' level of motivation or involvement. In fact, satisfied employees are

content in their jobs and with the status quo and feel no need to be empowered. Part of an FM's role should be implementing programs or communications that empower employees to participate in the facility process.

Empowerment is a multi-dimensional workplace process. It occurs within sociological, psychological, and physical dimensions. Employees discover the capacity to feel they are an integral part of the facility by acting on and influencing issues that they define as important. One significant implication of empowerment is that the individual and work community are fundamentally connected.

To engender a feeling of empowerment for occupants, an FM should encourage participation and continual dialogue and encourage employees to think outside of normal business parameters. Through managing by walking around and eliciting feedback from their customers, facility managers will have the ability to make everyone feel like they are contributing to a safe, healthy environment. They can make every day an exercise in affinity thinking...no idea is bad or thrown out. Positive reinforcement should be provided based on input, not necessarily the quality of that input. FMs can thereby capture and document employee feedback and results to evaluate and continually improve programs, solidifying and strengthening employees' feeling of empowerment.

engagement

intrinsic motivation

employee empowerment

occupant satisfaction & comfort

basic needs, safety and security

Employees make choices relative to their empowerment, motivation, and satisfaction. Being part of a sustainable community reinforces social sharing, creates role models and generates group recognition. Individuals can also take comfort in knowing that they are doing the right thing through the propagation of sustainable actions. The sense of belonging and esteem that accompanies empowerment aids in instilling intrinsic motivation.

## stepping up

Beyond satisfaction and empowerment is the challenge of getting employees engaged. Employee engagement is the extent to which employees feel passionate about their workplace, are committed to the organization and put discretionary effort into their work. Intrinsic motivation is a key component in engagement.

Intrinsic motivation refers to doing an activity for its own sake out of enjoyment and interest. It is the manifestation of the human tendency toward learning and creativity, which needs to be nurtured and maintained. Disillusionment and disappointment are deadly forces that may come to bear if dreams dissipate or promises are not kept. Choice and acknowledgement of feelings and opportunities for self-direction provide employees with a greater feeling of autonomy. Maintenance and enhancement of this inherent propensity requires supportive conditions and positive reinforcement.

Intrinsic motivation supports these needs. It argues for a focus on workers' desires to produce quality over quantity. Motivation that is based on meaning and interest is shown to be superior to extrinsic motivation that is based on pressure and rewards. Work environments that make workers feel competent, autonomous and related generates the right type of motivation, goals and work values.

When people have the freedom to rely on themselves to make decisions, they will become more engaged in the work they are doing. Strong messages relating to resource conservation efforts that are disseminated to employees will reinforce sustainable workplaces. Successes that are quantified and explained in the context of saving resources and improving the quality of life should stir employee engagement.

In today's economy, where the necessity of brainpower is so pronounced, employees desperately want to do things because they matter. It is the motivational driver behind engaged workers, innovation, passion and commitment. To feel that intrinsic motivational pull, employees need to be part of something bigger than themselves.

FMs can provide employees the ability to be engaged and committed to something they understand and know they can affect. Sustainability is the conscious and proactive use of methods that do not harm people, planet or profit while also leaving a positive impact. Employee engagement in continuous improvement involves inspiring workers to be sufficiently motivated to contribute to conservation and green workplace efforts, from an overall perspective down to everyday tasks.

Engaged employees contribute more to their organizations regardless of the task, but their improved contribution is especially apparent with discretionary tasks. If their intrinsic motivation has been primed with common sense and good sustainable solutions, they will invariably make the right choices.

Behavioral change that leads to employee engagement will lead to awareness of issues and solutions as well as data sharing and progress reports that create the transparency needed to sustain employee involvement. Enabling factors such as organizational support and peer interaction will facilitate attitude adjustments and the understanding needed for engagement in the workplace. This behavioral change needs to be sustained. Consistent and continual approaches work best, as success is hardly ever a big leap forward, and it arrives in a series of small steps over time.

## Top Steps

A true and successful progression goes beyond satisfaction and empowerment and leads to employee engagement. Maslow referred to this as self-actualization. Inherent in this phase is the concept of fulfillment. This progression supersedes emphasizing

One of the most widely mentioned theories of intrinsic motivation is self-determination theory, which states that people have three innate psychological needs:

### to feel accomplished

An activity results in feelings of self-development and efficacy.

### to feel related

The activity has meaning to the employee and there is alignment with kindred spirits.

### to be autonomous

The performance of a chosen activity was self-initiated or self-determined.

the present and creates voluntary contracts with the future, which is part of the goal of sustainability.

Facility managers are in the perfect position to teach personnel what it feels like to be empowered, and what it takes to be engaged. Through initiatives like sustainability and comfort in the workplace, FMs can provide the opportunity for their customers to taste the freedom that empowerment brings and experience the passion that being engaged evokes.

Taking care of people is one of the responsibilities with which FMs are charged. Cultivating the needs of all personnel and letting them achieve levels that extend beyond satisfaction can improve the attitude and productivity of building occupants. Providing the means to move up the pyramid and realize self-actualization, if only in specific instances, is another of those extra values that FMs can deliver — one step at a time. **FMJ**



**Bill Conley, CFM, SFP, FMP, LEED AP, IFMA Fellow**, is facility manager at Yamaha Motor Corp. in Cypress, California, USA. Conley has more than 40 years of experience in the facility management profession and has been a proponent of sustainable operations for more than 20 years. Conley has served on the IFMA board of directors, is a recipient of IFMA's distinguished member of the year award and has received the association's distinguished author award three times. He has been a regular contributor to FMJ for more than 20 years and has authored more than 60 FMJ articles.

# CASE STUDY:

## 21<sup>st</sup> Century Connections at MedImmune

Admit it: new technology is cool: the conference room that lets everyone know if the meeting actually occurred as scheduled; a work ID badge that allows people to print documents in a building they've never been in before, and then buy lunch with it. Facility managers must consider scores of constantly evolving technologies for building automation, environmental controls, AV conferencing and video walls, just to name a few. It's almost like facing the "when to upgrade my smartphone" dilemma each quarter. ¶ Of course, technology is not the only aspect of the site experience that can present a moving target for facility managers. Corporate acquisitions, leadership priorities, sustainability initiatives, funding allocation and even furnishing styles are just a few examples of dynamic factors that impact the work of facility managers in creating the site experience. ¶ Yet navigating the best use of technology is essentially grounded in the same principle as other aspects of facilities management — what is the site experience that will inspire colleagues and ultimately the enterprise to succeed? After the cool-factor inevitably fades, will the technology enhance, or inhibit, the optimum site experience? The likelihood of successfully leveraging technology at a facility is exponentially increased if it serves the core values and functions of the workplace and amplifies what's already working well. For example, electronic wayfinding might replace building directories and signage, but it cannot fix a poor layout and bad lighting!

### MEDIMMUNE'S TRANSITION

After MedImmune became the global biologics research and development arm of AstraZeneca in 2007, a transformation to MedImmune's Gaithersburg, Maryland, USA, headquarters was inevitable. MedImmune aimed to maintain the culture of a leading-edge, biotech start-up, backed by the resources of a global pharmaceutical leader. In recent years, the campus has expanded and transformed, facilitating up to 2,800 moves within the campus per year and renovating nearly a million square feet of office, collaboration and community spaces. The walkable campus includes seven separate buildings, with several others a short distance away.

The company is devoted to advancing disruptive science — pioneering innovative research and exploring novel pathways across oncology, respiratory disease, cardiovascular, renal and metabolic disease, and infection and vaccines. Collaboration, creativity and innovation are vital to the advancement of science, and the campus experience must support those values, not only in the laboratories, but throughout the facilities.



To that end, traditional office and cubicle layouts have been replaced by an activities-based design working environment. Spaces reflect the activities of the workday, a strategy that AstraZeneca calls “iWork.” Employees have work stations in open areas, and rooms are assigned to functions, like team rooms, conference rooms, libraries or quiet rooms. Common social areas are found throughout the facilities, often incorporating food or coffee service, or stress-relieving activities like ping pong and video games. Décor and displays reflect the science-led mission of the people who work there. Research visualized as art with a rotating display of scientific publications and a growing timeline of patents decorate the hallways, and scientific themes such as DNA proteins etched into glass help identify each building and floor.

It is against this backdrop that a series of technological enhancements have been made to the site, with additional projects in the pipeline. Naturally, a biotech R&D site uses technology to advance science in the laboratories, but technology upgrades are also vital to facilitate communication and collaboration

among all functional groups and to make services and employee perks easier to access and use. Some of the recent changes have been driven by top-down strategy, while others have been driven by the facility management team’s mandate to continually re-invent and realize the campus experience through both the physical environment and the services that promote collaboration and engagement and enable campus employees to thrive.

#### RESPONDING TO DIRECTIVES

Like many global corporations, AstraZeneca sought to reduce the environmental and financial costs associated with business travel, as well as the impact on the work-life balance of its employees. At the same time, facilitating collaboration across a global portfolio of locations is a top priority. The solution: substantial investment in video conferencing (VC) capability. This change dramatically expanded the number of VC-enabled conference rooms across the portfolio, significantly decreasing travel spend without compromising collaboration.

The facilities management team at

Gaithersburg soon realized that the employee experience would be enhanced by adding VC technology to the smaller, impromptu, team rooms. With the increased adoption of video conferencing, larger rooms were oftentimes reserved for a single individual who had been invited to the meeting. To meet demand, and enable more effective use of the larger conference rooms, VC technology was added to 260 team rooms across the site. As a result, the Gaithersburg campus now offers 350 VC capable rooms, nearing half the total of the entire AstraZeneca portfolio.

Selecting the right technology is always a challenge for facility managers. It is not uncommon that by the time a project is ready to “go,” there is a newer version of the desired technology available or even a completely new (and sometimes more affordable) solution. Gaithersburg selected an easy-to-use videoconference system as the initial product for conferencing, in part because it offered a simple button-start option for employees, and a quality face-to-face experience. Soon, the roll-out of Skype for Business and Virtual Meeting Rooms (VMRs) made conferencing available across multiple

platforms, which can link teams in VC rooms with colleagues in any remote location, even outside corporate facilities, allowing users to “self-serve” their video conferencing option, using the technology link that is best-suited to their device and location ... anywhere, anytime.

### NEXT-GEN HUDDLE ROOMS

The next generation of collaborative spaces being rolled out in Gaithersburg are smart-technology-enabled huddle rooms for brainstorming. What if the in-room video screen and whiteboard were essentially computer accessories linked to the laptops of meeting participants? And what if the dominant conference table layout was replaced with a fungible set of seating with tables of various heights which can easily be repositioned to suit the needs of the team at a given moment? This set-up would allow endless two-way whiteboarding during dynamic meetings with automatic capture and optional electronic distribution of all notes.

Unlike traditional conference rooms with stationary seating, the high tables and versatile layout encourages impromptu, cross-functional collaborations while the technology provides an easy platform to start sharing data. Participants in linked rooms can take turns adding notes and manipulating molecular models on screens, enhancing ideation and collaboration. Furnishings and smart-whiteboard walls are designed to provide a seamless experience.

To date, twenty of these rooms have been designed into the Gaithersburg facility, including one in a laboratory team room, the first of its kind on site. The lab team room is located behind the “air-lock,” allowing scientists ready access to the same collaborative technology and environment found elsewhere on site.

### EXPANDING ACCESS

MedImmune’s 400-person Hockmeyer Auditorium is an important campus asset, serving as the site’s location for town halls, science summits and external conferences, many of which are recorded or live-casted. Prior to the technology upgrade completed in 2017, limited AV capability was present but higher-quality productions required outside support and additional resources.

At what point does “higher-quality” become the standard? That is often the point when the case makes itself for technology investments.

Another key consideration for investing in equipment as opposed to outsourcing is the lead-time to set-up the external video production. All the connections and the cameras require set-up and testing a day prior to events. Add in the recovery time to return the auditorium to baseline function, and the downtime of the room for a single, two-hour event could often extend to two days.

The Gaithersburg Site Ops team wanted to offer a consistent, “on-demand” video recording experience to amplify the reach of the events held in the auditorium. A further goal to make the auditorium available to more users on campus. The reliance on outside tech support was the solution that became a barrier to fully leveraging the auditorium to serve the business, consistently and efficiently.

The costs of external AV support had largely been carried as expenses by the different internal customers using the services, not as part of the site operations budget. A more creative approach to securing the capital required to establish in-house AV recording and broadcasting services was needed. Without the availability of a typical ROI proposal, building the successful business case included substantiating the costs of outside technical support and auditorium down-time, scoping the project costs by “nice to have” and “need to have” features and benefits, and highlighting the enhancements to the in-room experience and new standard menu of services.

The approved technology upgrade to the auditorium included four robotic VC cameras to automatically focus on speakers, a production switching table, a digital recorder and a screen and speakers in the foyer of the auditorium to accommodate overflow crowds. In-house support was trained in use of production and editing equipment, and video sharing, so that the function became truly on-demand.

Ultimately, the capital investment in the in-room technology freed up ongoing expenses across the organization, that could then be reallocated to core business areas. Additionally, the conference room is more fully leveraged to support

collaboration, employee engagement and the advancement of science through wider dissemination of ideas.

### ASSESSING PERKS


Technology plays a vital role in essential work functions, but it can also enhance the campus experience for employees in larger ways by reducing stress and promoting health and well-being. These applications are powerful tools to convey that not only does the company want to facilitate work and drive organizational priorities, but it values the people doing the work and their lives.

Recent cafeteria renovations in Gaithersburg have included tech features in addition to new food choices. Self-order kiosks and self-pay stations allow guests to make customized orders and then pay for meals while their food is being prepared to reduce wait times and congestion. Nutrition kiosks provide up-to-date information about menu selections, and data can be linked to the app MyFitnessPal for employees tracking their meals.

The facility has also added treadmill rooms to encourage movement at work and nap pods as part of its health and well-being program. The pods provide a controlled twenty-minute rest to re-energize employees for the rest of the day. The fitness center will be offering virtual, on-demand, instructor-led exercise classes for employees to use outside of onsite classes.

### WHAT’S NEXT?

The next tech advances on campus will focus on how people are brought in to the site and how they find their way once they are here. As part of main lobby renovations to the MedImmune headquarters building, a virtual guest-management system will be installed. Visitors will be pre-loaded into a system, allowing security to more quickly process guests into the facility.

Looking ahead, planning is underway to add electronic wayfinding stations in the hallways and conference room booking panels. The panels will be linked to sensors in the rooms that will continually update the status of the rooms, automatically canceling meetings when participants don’t arrive, freeing the resource for the next team. 

## THE “WHYS” AND “HOWS”

In rolling out enhanced technology to the facilities, the Gaithersburg Site Operations team established a set of best practices. Overall, the guiding principle woven throughout the site operations approach is to leverage technology in a way that facilitates a collaborative work environment, supports business goals, provides reliable analytics and metrics and a simple interface for employees to help deliver the best investment value to the organization.

- » Plan and design projects to meet the needs of business stakeholders, including value and return on investment.
- » Keep the employee or “customer” experience in mind.
- » Collaborate closely with the IT department to ensure that new technology marries well with existing (and near-future) platforms and infrastructure.
- » Align with corporate campaign for simplification in IT and other operational best practices.
- » Work with the facility team to balance technology performance with overall space design considerations — such as balancing screen visibility with optimal room lighting, providing black-out shades or etched glass for confidentiality while preserving natural light transfer to interior spaces, and considering sound mitigation.
- » Create an extensive customer communication plan to introduce new technology to employees, to offer training and on-demand troubleshooting/support services.



**Jason Jones** is the the associate director of workplace services at the MedImmune R&D Headquarters in Gaithersburg, Maryland, USA. Prior to that, he served as a facilities projects associate focused on design and construction at Regeneron Pharmaceuticals, a life sciences and technology company. Jones has more than 15 years of experience in the facility management profession in the pharmaceutical industry, extensive move management subject matter expertise, and over 25 years’ experience managing workplace services focused on technology, the built environment and the employee experience in corporate and retail sectors.

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# A NEW KIND OF FM

In recent years, the many cogs and factions that make up the facility management industry have begun to coalesce around the term “workplace.” This is evident in the sheer number of FM events that have adopted the label including IFMA’s own annual conference, World Workplace.

The genesis of this trend is multi-dimensional — shaped by social, economic and technological factors — but a dominant driver has undoubtedly been a greater understanding around the impact working environments have on people and broader business performance. The very best workplaces in the world, some of which were on show at Workplace Week in New York last month, have changed our expectations around the look, function and purpose of office space. These workplaces are designed much like ecosystems — every inch designed with the comfort, wellbeing and productivity of the people who occupy them in mind.

It is an approach increasingly referred to as “workplace management.” Naturally, the FM sector has a stake in this new worldview. However, a genuine shift from FM to workplace management demands more than just a change of label; it requires the complete reimagining of users’ relationship to the workplace.

Historically, FM has been limited to a cost-driven management of buildings and the operation of services, but this new function is responsible for the curation and management of the workplace experience. Workplace management is about designing and delivering multi-faceted, minute-by-minute, multi-sensory experiences that create an emotional response. It is about designing workplace experiences in much the same way a retailer would, considering every second to deliver a specific “mission.” It encompasses thinking about journeys and destinations, the fusion of space, information, services and how these reflect organizational personality, support human effectiveness and are attractive to your target employee.



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## THE RISE OF KNOWLEDGE WORKERS

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As industry and the economy shifted from the factory floor to the corporate workspace, a new type of worker emerged. Creative and technology industries flourished, and businesses became more reliant on employees with specific professional, creative and technology-based skills. Meanwhile, the inevitable technological advances in artificial intelligence and automation over the coming years will eradicate even more process-related jobs and place further responsibility on these knowledge workers.

Today, then, the most valuable assets in a modern organization are often the employees who are generating the profit. So, the onus is on employers to create environments that generate positive workplace experiences and provide workers with the tools to boost wellbeing, engagement and productivity and to enable them to perform at their best.

In a competitive commercial world, designing the best possible workplace and workplace experience is crucial to recruiting and retaining the best talent, too. Knowledge workers are in high demand and they require workplaces that provide them with qualities such as freedom, flexibility, collaboration, comfort and easy access to technology.

## ENABLING COGNITIVE PERFORMANCE

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With businesses now essentially recruiting for “brainpower,” the goal should be to create working environments that do not consume energy but are designed to support elite knowledge workers’ mental performance. Yet there are a significant number of factors that affect an employee’s ability to do his or her job in the workplace. These include a person’s lifestyle habits such as sleep, hydration, nutrition and general fitness, but also environmental elements like lighting, noise, interruptions, and temperature — all of which, if not carefully managed, can create a drain on cognitive capacity.

The human brain is not what it seems. We only have one brain and the majority of its capacity is devoted to managing human physiology: our temperature,

## LESSONS FROM OTHER SECTORS

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There are excellent examples of other industries designing environments in an effort to increase performance and achieve better outcomes. In manufacturing, for example, the design of factory space has been led by process and science. This is epitomized by the Toyota Production System, a lean management method developed by the Japanese car manufacturer in the 20<sup>th</sup> century, which revolutionized manufacturing by cutting out as much waste from the production line as possible. Key to this method was identifying the areas of the factory plant that added value, which saved money and boosted productivity in the process.

Similarly, in the retail world, a great deal of time and money is spent on understanding how environments impact customers, influence their buying

habits and keep them coming back. Big food retailers and car brands such as Jaguar Land Rover are constantly investing resource into fine-tuning the products and services they provide customers. Here, the objective is to not simply increase sales but improve important supporting elements like customer loyalty and brand image.

Corporate organizations, however, are missing a great opportunity to apply many of these important lessons to their own workplaces. The aim should be to treat employees (or users of a workspace) in the same way the consumer world serves customers — by designing effective workplace experiences, engaging people on a human level and even cultivating strong emotional connections between people and organizations through the design of workspace. Building environments that communicate the organization’s brand and objectives is key to this agenda.

our digestion, our cardiovascular system and so on. So, anything that places a burden on our brains consumes cognitive capacity. If someone is too hot, the brain is working to cool them down. If someone cannot see well because of poor light, the brain has to deploy capacity to “approximate” what words and pictures look like. If someone is distracted by a conversation, they have to deploy more brain power to overcome that distraction. If someone has to fight to connect their laptop to the AV kit in a meeting room, the same is true. All of these “experience failures” detract from the pool of cognitive energy a person can devote to business related intellectual tasks. One fundamental aspect of workplace management, therefore, is the creation of fault-free workplace experiences that are frictionless and place no burden on a person’s cognitive capacity resources.

Previous research carried out by Advanced Workplace Associates (AWA), however, found that employees are not always appreciative of the impact these factors can have on their performance, and they find it difficult to break these bad habits when left to their own devices. So, the workplace management function should not solely focus on designing and managing the workplace experience but also on educating the users on how to live their work lives in order to be at their most effective every day. If a building has been refurbished to improve elemental factors such as lighting, space and sound, or to introduce new ways of working, this should be accompanied by a change management program that encourages people to alter their behavior.

Dehydration and bad nutrition, for example, can have a detrimental effect on cognitive performance, even causing physical symptoms such as headaches and fatigue — which means employers should coach their employees and encourage consumption of the right foods and levels of water. Likewise, if an employee requires an environment for a specific task — maybe a quiet area for concentration work or an


informal space for a group brainstorming session — it is the role of workplace management to ensure that this is clearly signposted and that employees understand expectations within the workplace.

Meanwhile, more intangible factors are at play when defining the workplace experience that are likely not familiar to the average FM practitioner. These include aspects such as social cohesion, supervisory support, vision clarity, information sharing, external communications and trust. When it comes to social cohesion, for example, networking areas can significantly improve an individual’s connection to colleagues. Open areas as well as a policy of openness and transparency, on the other hand, can engender a greater level of trust. Organizations need to teach employees new tricks to help them to be more social and give them the opportunity to be more productive.

## A FRAMEWORK FOR EXPERIENCE

Ultimately, the role of workplace management should be to determine the most effective experience and conditions for organizational and employee performance, effectively creating a baseline for any future design. In 2015, AWA facilitated the creation of the Workplace Management Framework with a cross-industry UK group. The Framework aims to identify and maximize the strategic and economic benefit of the workplace as a business tool. At the core of this framework is the necessary alignment of the workplace design and services with the core purpose of the organization. Some practical steps that organizations can take to develop a strategic workplace management function include the creation of company-wide workplace vision statement, a workplace strategy endorsed by senior business leaders and the implementation of quality improvement processes. Once an organization has designed a workplace experience, it could even set out a series of measurements that determine whether this is being adequately delivered.

However, this will require a transition from a set of disparate support services to a holistic workplace management function. Creating the right experiences hinges on everything from brand values and marketing image to the functional needs and demographics of employees. Developing positive workplace experiences is therefore only possible through the collaboration of areas such as FM, IT, property, marketing, sustainability, HR and external suppliers. Nor should workplace management be static. As technology becomes more sophisticated, science gets smarter and new trends emerge, a new workplace management function should aim to continuously determine and impart the best research on the productivity of workplaces and individuals.

FMs might not currently possess the capability to effectively manage the workplace experience, but the sector can build on a solid baseline of operational excellence. The necessary next step is to create a role that fills this new job description, such as the “chief workplace officer” (CWO). These CWOs will need to understand the creation and management of experiences, the marketing discipline, business strategy and business planning processes, neuroscience, psychology, architecture, IT, risk management, and service management — and be able to link all this to business strategy to land a punch in the boardroom. 



**Andrew Mawson**, *Managing Director of Advanced Workplace Associates*, is a leading pioneer,

*thinker and speaker on matters ‘work and place’. He can span the worlds of business strategy, organizational design, work strategy, workplace design and change management. In his consulting work, he has led workplace change programs with clients including Invesco, UNICEF, Willis, Direct Line Group, National Rail, Royal Bank of Scotland and Merrill Lynch. In 2014, Andrew worked with the UK Cabinet Office as an adviser, participating in a review of 13 government departments’ performance in implementing agile working as part of the government’s Civil Service Reform program, which has been instrumental in reducing the UK Government’s property portfolio by 20 percent.*

FMs might not currently possess the capability to effectively manage the workplace experience, but the sector can build on a solid baseline of operational excellence.

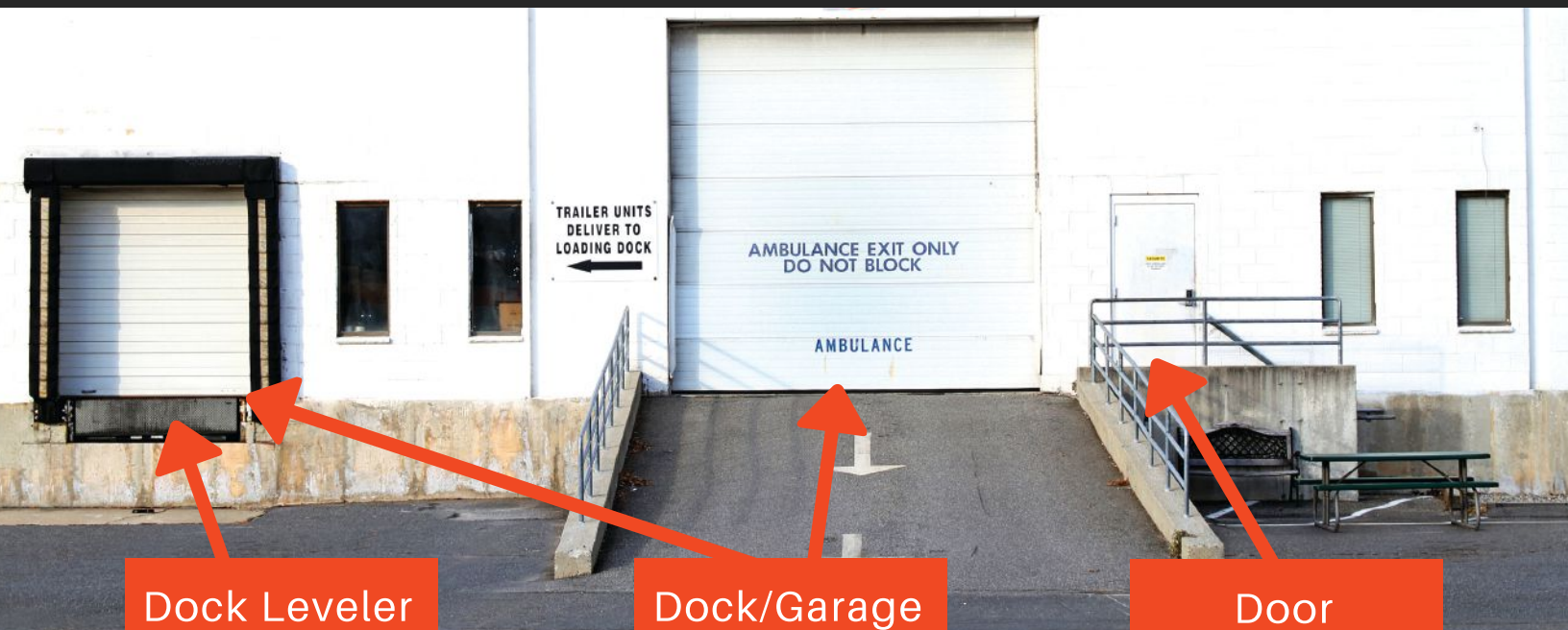


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# future forward visions

BY DOMINIC IACOBUCCI

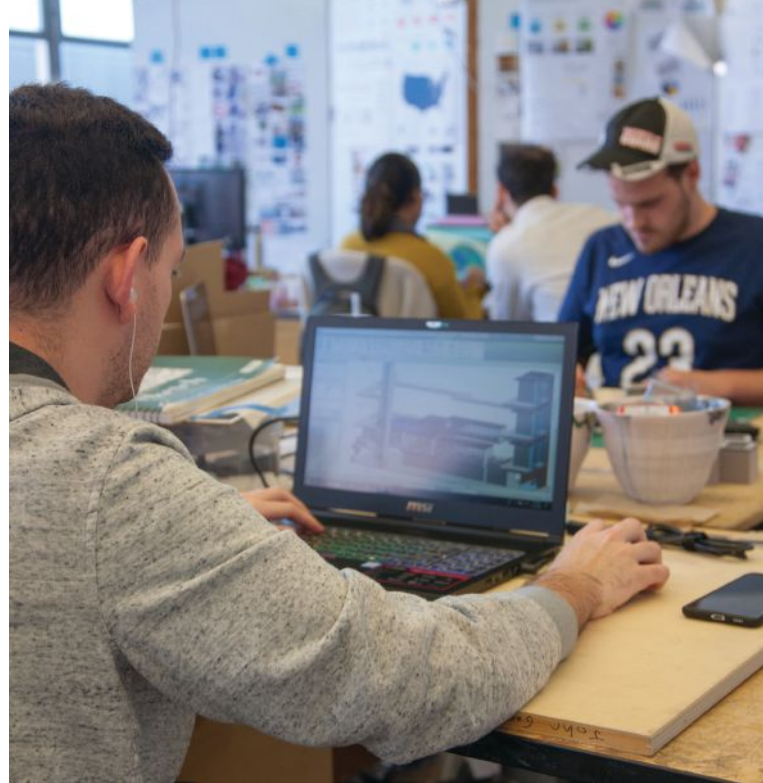
Picturing the workplace of the future has always been part of the facility manager's job, but it's never been more challenging than it is today. Technology that affects the workplace is advancing at a rapid pace — sometimes reflecting changes in society, sometimes actually driving those changes. With employment patterns evolving as well, there's no guarantee that today's state-of-the-art workplace will still be relevant five, 10 or 15 years from now.

An innovative partnership between the University of Cincinnati, BHP Architecture and several other businesses is endeavoring to meet this challenge through “The Future of Work” — a series of “studio” type classes for students majoring in architecture, sociology, engineering and design. Creative thinking is a key requirement for these college students who are just starting to enter the workplace.

No one wants to design grand plans for office buildings that soon will be obsolete. “The Future of Work” is a fresh way to tackle that issue while focusing on the people who'll work in those buildings, not just the structures themselves.

Designing for the future poses a conundrum for organizations and architects. For example, how many office plans used to prioritize tech features such as Wi-Fi or technology-centric rooms? Now, it's the norm. Additionally, designers must think about how to create smart facilities that provide information, connect people, support the Internet of Things and eventually support virtual and augmented reality applications.

The University of Cincinnati students were urged to create visions of the future, then design workplaces responding to specific aspects of those visions. The result: thought-provoking projects that just might jump-start facility managers' creative ideas about the future.



## open-ended approach

**This year's spring semester architecture studio was the fifth in the “Future of Work” series. It drew impetus from Frank Lloyd Wright's statement that the architect must be a “prophet” of sorts. Why involve college students in such a lofty endeavor? At this stage, they are relatively free of bias about workplace design. Yet all 16 students in this class were seniors who've already had job experience in several workplace environments through the University of Cincinnati's cooperative education program. Also, creative problem-solving is an integral part of training for all architecture students. Topics were not assigned. Rather, an open-ended approach allowed students to tackle subjects in which they have a passionate personal interest. The program aimed to balance brainstorming with real-world observation. For example, students toured several Cincinnati-area workplaces representing a range of approaches, including a technology analytics company, a bank with a forward-looking innovation center, several sites with co-working environments and a brewery whose innovative workspace includes a conference and meeting area. Working in two-person teams, students pursued topics ranging from the quotidian details of workplace life, to climate change and to global trends such as employee displacement and urban reinvention.**

## problems, solutions, and visions: student projects



**“Nature in the Workplace”** looks at the benefits of plants in the office environment. Why invest in real, live plants rather than ones made of silk or plastic? Students turned up statistics such as a 12 percent increase in productivity and a reported 88 percent increase in employee well-being. Also, benefits such as noise reduction and improved air quality can occur with a minimal amount of plants. “Many workers may go their entire day without exposure to the outdoors. Modern office spaces have lost opportunities for increased productivity and well-being by depriving their employees of access to nature.”



**“Superblock”** examines the so-named innovation in Barcelona, Spain, linking it with the emerging trend of autonomous vehicles. The superblock merges an area of nine city blocks into a mega neighborhood dominated by walkable areas, including businesses and green spaces. Within the superblock, vehicle traffic is severely restricted. “As the amount of work we get done in a day increases, our breaks will be spent more around the amenities within walking distance. Superblocks create lively new communities and encourage a more active work life by suiting city blocks for small businesses that are geared toward pedestrian lifestyles.”



**“A Freelance Future”** cites an estimate that in less than a decade, up to half of the U.S. workforce will consist of people working as freelancers on a project-to-project basis. “Co-working spaces can provide some of the necessary amenities and flexibility, but they often lack the communal and social benefits of a traditional office environment.” Proposed solutions include specialized spaces to meet freelancers’ needs, sections of buildings to house groups of freelancers working in the same specialty areas and satellite offices that expand an organization’s footprint in new ways.



**“Climate Change, Extreme Weather and the Workplace”** explores effects of climate change that companies might not be preparing for yet – but should be. “Volatile storms and flooding have a direct impact on our cities, office buildings, how people get to work and how they work.” Suggested interventions include external shading systems and improved insulation to deal with extreme heat, measures to prepare for intense winds and drainage and rainwater management strategies to cope with storms and flooding.



**“Intertwined”** pictures a workforce altered by technology, in particular the growth in artificial intelligence and computing capabilities. In this scenario of a more mechanized workforce, people will find themselves more intertwined with machines and less involved in interactions with other employees. “Office space must respond to these issues and evolve to foster new ways of social participation lost in today’s tech-driven pursuit of efficiency.” Flexible seating and open floor plans were among the ideas for encouraging collaboration.



**“Agents of Change: Balancing the Multi-Generational Workforce”** deals with considerations for office environments that include workers of different generations. Business leaders are beginning to realize that they will have to make some significant changes to accommodate these vastly different demographics. Examples: workstations that are more flexible than old-style cubicles, more open floor plans and collaborative spaces geared to the preferences of younger workers.



**“Comfort”** notes that despite accommodations in the past, such as ergonomically designed furniture, workplace comfort is an individualized experience. A future in which “flexibility and individualized comfort will become paramount” will require adaptable spaces and some innovative approaches. These could include variations in color, lighting and temperature. Some research shows that when these factors are adjusted to reflect people’s circadian rhythms, there are positive effects on wellness and productivity.



**“Company Life Cycle and Adaptive Reuse”** looks at the impact of companies that plan hub offices in large-scale towers, but then reorganize and leave before the building reaches the end of its lifespan. “These empty buildings have a negative effect on cities, but an influx of skilled workers and new companies demands creative architectural solutions.” Ideas for adaptive reuse include plans for repurposing a tower – or an entire campus – to accommodate multiple “spoke” occupants rather than a single headquarters.



## new ways of thinking

Envisioning tomorrow's workplaces was an eye-opening experience for the students who eventually will be designing and working in them.

Shoshanna Sidell, 21, saw her exploration of the superbloc system as a way to accommodate urban populations. "My idea of working within a superbloc system incorporates well with the idea of developing the growth of cities," she said, and would "foster a sharing culture in a walkable urban space."

For Jonah Pruitt, 21, an interest in adaptive reuse had its roots in childhood memories of helping his family remodel a 100-year-old house. He sees the process of adapting existing buildings for new uses as providing a sense of solidarity with their surrounding communities — an alternative to the process of displacement that is a concern in many urban areas around the world. "Workplaces of the future will need to be flexible and agile, while maintaining the trust and goodwill of communities where they are located to ensure the best quality of life," he said.

Evan Schlenk, 22, was interested in long-distance communication strategies that would work for a solar generating farm and offices for a major energy company. "My proposal reorganizes a traditional office around an augmented reality hub," he said. "This hub allows for 3-D interaction between designers and engineers located in different offices. It allows

for collaboration traditionally reserved for face-to-face interaction to take place between people working remotely."

Srimoyee Sinha, 21, wanted to address the monotony of the typical workspace, and at the same time encourage collaboration. Her brainstorm was movable pods — on casters so they roll around. "When the need of collaboration arises, one can just move their pod to attach themselves to the person or persons they are trying to collaborate with," she said.

## takeaway considerations

While students' ideas varied widely, several themes emerged as primary topics for the future.

The human experience of work — and life — is a central concern for designers and is continually evolving. Workplaces of the future should include "technology-free" spaces to provide comfort and allow for the occasional disconnection from an overly connected world and more opportunities for stimuli provided by the natural world. These spaces should be considered especially for work that requires concentration as well as team collaboration that is focused on innovation and problem-solving.

Tactics for adaptability, always vital to business success, will become even more important amid rapid changes in technology and society. Another key trend already coming into play involves changing modes and patterns of transportation. These will

require new solutions for design, security, collaboration and connectivity.

Trends such as mergers and acquisitions, as well as disruptive technologies and companies, spotlight the need for effective strategies as businesses grow, shrink, adapt and change at a quicker, dizzying pace.

Worksite technology increasingly will be

**"Overall the experience has been different from anything I have done so far in my school career. Trying to plan for the future, you begin to realize that everyone has a different idea of what the future could be. It is a matter of taking pieces of several ideas to really get an idea of what the future could be."**

— Hannah Johnson, 22

*Her project delved into ideas for using technology to bring people together, rather than isolate.*



immersive, with a mesh between the virtual and physical worlds. Example: A white-box workspace can be augmented with colors and patterns to suit the individual or become a framework for walking through a virtual world.

Companies will need to become ever more concerned with societal trends and the communities in which they reside, becoming leaders and agents of change. The need for support amenities will remain constant; however, there will be a shift toward supporting an entire community, not just a single organization.

Adaptive reuse issues will be particularly relevant in urban areas where there are underutilized buildings and space, said Michael Rogovin, a University of Cincinnati adjunct professor and “Future of Work” instructor. It will be important to ask whether it is possible to adapt existing structures instead of building new ones.

Facility managers will have to balance the usual concerns about cost with the need to be concierges of sorts, focused on creating experiences and opportunities that pro-

mote productivity. Efficiency and effectiveness must be balanced with both employee and customer experience. The current thinking of dollars spent per square foot of office space needs to shift to dollars spent per employee, with a focus on intelligent, intentional design that creates diversity and sense of place.

For instance, considering circadian lighting might seem esoteric and installing live greenery might add to maintenance tasks. But the impact on people’s work experience should not be underestimated, even though maintaining these types of systems is more complicated for a facility manager.

“Bringing nature indoors could be as minor as providing small houseplants at workspaces, all the way up to greenhouse-like indoor environments,” Rogovin said. “The upside is direct engagement with plant life; however, there is an increased cost to upkeep.”

Other strategies to provide exposure to nature can be built into facility or structure design, he noted, such as windows with a view and courtyard spaces. Even a digital display showing natural scenes, or

the use of natural sounds as white noise, might provide positive effects with less maintenance required.

It’s not always simple to predict how global and societal trends will shape work environments. However, facility managers can be key players in creating competitive advantages that propel their companies forward. It makes sense to take a fresh look at how workplaces could change to accommodate societal changes, environmental factors and human experience through different ways of working. **FMI**



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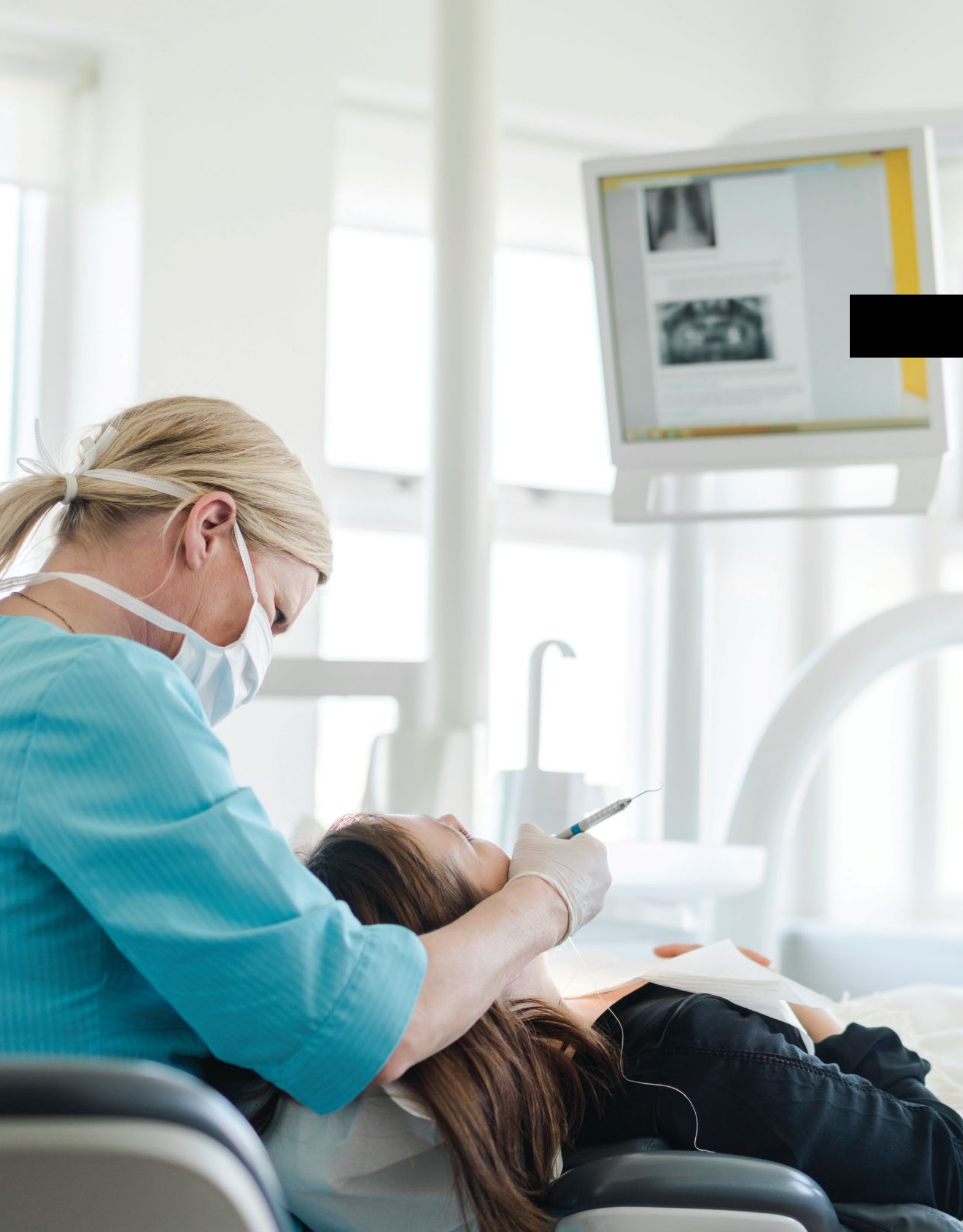
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# DENTISTRY

## Updated Gas & Vacuum Systems Facility Codes

Many shopping centers, strip malls and office buildings contain dental practices. The presence of these facilities typically does not result in major impacts to the building's fire and life safety design and maintenance. There are, however, special provisions that must be observed in regards to the piped gas and vacuum systems commonly installed that serve dental applications. A new chapter in NFPA 99, Health Care Facilities Code, has been added to the recently published 2018 edition of the code and specifically addresses these systems. The chapter's purpose is to clarify what must be done to ensure that the systems comply and provide the expected level of safety to patients and staff in these facilities.

NFPA 99 is a unique document because it does not care what type of occupancy a building is. Rather, its application is based on whether or not any kind of health care is provided in the building. This means the code applies to everything from acute care hospitals to doctor's offices for routine check-ups to dental offices. In fact, the definition of health care facility in NFPA 99 can apply to whole buildings, portions of buildings, or mobile enclosures, and is specifically defined as "buildings, portions of buildings, or mobile enclosures in which medical, dental, psychiatric, nursing, obstetrical, or surgical care is provided."

The code addresses numerous building systems and types of equipment that are found in health care facilities. Based on the risk that is present to patients and staff, the document is scalable, meaning the application from an acute care hospital to a family dentist office will vary.

### Why focus on dental?

Dental facilities provide a wide range of services, and procedures performed in these settings are increasingly utilizing deeper levels of sedation and anesthesia. The patients undergoing these procedures are therefore at more risk to a variety of factors pertaining to the dental gas and vacuum systems.

One of the risks centers on vacuum systems. The vacuum pumps found in the more traditional dental settings are lower-powered pumps. While they perform very well in traditional dental offices — sucking up blood, water, and other material from a patient's mouth, for instance — they may not be sufficient in other settings for clearing the throats or for endotracheal tubes of unconscious patients, who are prone to aspirating. Pumps with the appropriate power have been required for hospitals and ambulatory surgical centers, but this appropriate power level has not always been applied to dental settings.

Another risk is the use of nitrous oxide, which has been used as a sedative in the medical field since the 1800s. Ni-

trous oxide is used in many dental applications and administered with oxygen in a 2:1 ratio. Without oxygen, the delivery of pure nitrous oxide can result in brain damage and even death. NFPA 99 goes to great lengths to ensure that the correct gases are delivered to the correct gas outlets. When the piped gas lines get crossed, one could accidentally be providing nitrous oxide instead of oxygen, which has tragically been the case in documented events.

While NFPA 99 has included requirements for these systems in dental applications in previous editions, a dedicated chapter has been added for the first time in the 2018 edition. This new chapter is intended to improve what has previously been inconsistent use and application of NFPA 99 for dental facilities. The addition should make the requirements easier to follow for dental professionals and facility managers responsible for the management of the systems while improving the level of safety provided to patients and staff.

## LEVELS OF SEDATION/ANESTHESIA

The key driver for identifying risk in these settings is the level of sedation/anesthesia that is being provided to patients. There are four levels defined within NFPA 99 and the providers will have to provide insight to define what levels are offered at each individual dental practice.

**General Anesthesia** is a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation. The ability to independently maintain ventilatory function is often impaired. Patients often require assistance in maintaining a patent airway, and positive pressure ventilation may be required because of depressed spontaneous ventilation or drug-induced depression of neuromuscular function. Cardiovascular function may be impaired.

**Deep Sedation / Analgesia** is a drug-induced depression of consciousness during which patients cannot be easily aroused but respond purposefully following repeated or painful stimulation. The ability to independently maintain ventilatory function may be impaired. Patients may require assistance in maintaining a patent airway, and spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained.

**Moderate Sedation / Analgesia (Conscious Sedation)** is a drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patient airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.

**Minimal Sedation (Anxiolysis)** is drug-induced state during which patients respond normally to verbal commands. Although cognitive function and coordination may be impaired, ventilatory and cardiovascular functions are unaffected.

**NFPA 99 code uses category designations based on sedation/anesthesia to specify the technical requirements for dental piped gas and piped vacuum systems:**

### CATEGORY 1

General anesthesia and deep sedation.

### CATEGORY 2

Only moderate and minimal sedation is performed.

### CATEGORY 3

Minimal or no sedation is performed.



# Key provisions for proper application

All provisions in NFPA 99's dental chapter must be followed in order for dental gas and vacuum systems to maintain compliance. Here is a snapshot of some of the key provisions in the code.

**STEP 1** The leaders of the dental practice need to indicate/define the highest planned level of sedation/anesthesia offered to patients.

**STEP 2** The appropriate category designation must be made based on the level of sedation/anesthesia provided.

**STEP 3** Determine the gases required by the facility. NFPA 99 does not require the installation of gas or vacuum systems but when they are chosen to be installed, they must meet the requirements of the code based on the appropriate category.

**STEP 4** Identify the storage locations for the gas cylinders, air compressors, and vacuum pumps. These locations need to meet certain criteria and are limited to what else can be stored in these location. This is important during initial planning and for maintaining compliance.

**STEP 5** Ensure that shutoff valves are in appropriate locations. Category 1 systems will require more shutoff valves, including zone valves outside of each anesthetizing location. For Category 2 systems, emergency shutoff valves need to be located so as to be accessible from all use points in an emergency.

**STEP 6** Make sure that alarm panels are provided and appropriately located. The gas and vacuum systems in Category 1 and 2 systems are required to be monitored for conditions in which they are not working or are in a hazardous condition. The single alarm panel is required to be located in an area of continuous surveillance while the facility is in operation.

**STEP 7** Confirm that an appropriate maintenance program is developed. Category 1 systems require the development of inventories and the establishment of intervals and procedures for inspection and maintenance. Category 2 and 3 systems must maintain equipment in accordance with the manufacturer's recommendations and have a procedure for shutting down the gas supply (for cylinders) at the end of each day.

Category 1 dental facilities where general anesthesia or deep sedation are performed must meet the most stringent requirements for their gas and vacuum systems. These systems will look similar to the source air compressor and vacuum pumps found in hospital settings and need to meet most of the same requirements. The locations housing the sources of the gas and vacuum systems will need to have one-hour fire resistance rated construction, need to contain only the source equipment and must have proper signage, among many other requirements. The system must also be both installed and then verified by certified individuals.

Category 2 dental facilities where moderate sedation is the highest level of sedation provided will have to meet Category 2 requirements. This includes specific provisions for medical gases, for oxygen and nitrous oxide. Their storage locations have to meet criteria depending on the volume of gas that is stored within the cylinders but is generally less stringent than those locations in Category 1 systems.

Category 3 systems are addressed for facilities which offer only minimal sedation or none at all. These facilities only utilize dental air that drives dental devices and dental vacuum used for oral evacuation. There are no medical gases in these types of facilities. There is still a great deal of criteria for the appropriate design and installation of these systems, but the requirements are not as restrictive as Category 1 or Category 2 systems.

## SYSTEM INSPECTION AND MAINTENANCE

The piped gas and vacuum systems in each category must be properly maintained in order to remain safe and reliable. For Category 1 systems, there needs to be an inventory of all components of the systems, including all source subsystems, control valves, alarms, and outlets. Inspection schedules and procedures as well as maintenance schedules must be developed and documented based on a risk assessment or in accordance with the original manufacturer's recommendations. Category 2 and Category 3 systems do not require quite as much and simply need to be maintained in accordance with the manufacturer's instructions, and every facility must develop a procedure for turning off the gas supply at the cylinder valves (where cylinders are used) at the end of each day. FMJ



**Jonathan R. Hart** is a principal engineer for the NFPA. He is the engineer responsible for NFPA 99, Health Care Facilities Code, working with the seven technical committees and the correlating committee responsible for the development of the document.

**NFPA offers free access to NFPA 99, Health Care Facilities Code, including the new "Dental Gas and Vacuum Systems" chapter (Chapter 15). Visit <http://NFPA.org/99a>**

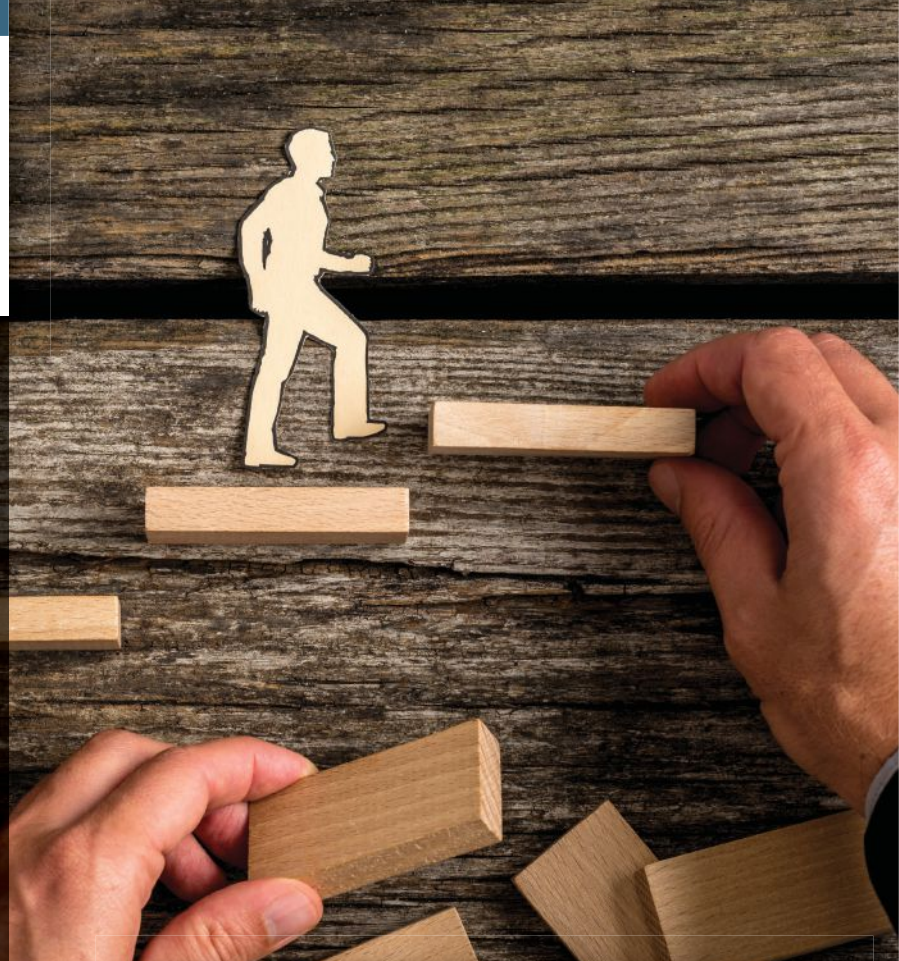


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# designing for aging & dementia

When the Cottages — an aging and dementia facility — opened on the more than 100 years old campus of Western Home Communities in the small town of Cedar Falls, Iowa, USA, a flurry of comments flew among the nursing staff. Most of the residents in care had been moved from larger residences on the WHC campus where they had lived long-term and were under social familial care (the household model) with the same staff. Yet when residents moved into the Cottages, the nursing staff noticed a startling change: residents began to eat better and engage more because of the Cottages' new concept in perceptual and cognitive design.

This project demonstrated for the first time that senior housing can be designed using aging science with a focus in aging perception and cognition. Most senior housing and nursing homes accelerate aging decline by fostering the need to withdraw because their environments have limited daylight and are too noisy, bright, drafty, and smelly. Their care model often supports the need for depen-

dence and protection rather than the need for a reasonable quality of life.<sup>2,3</sup>

Elderly care is difficult on many levels, whether from a caregiver's perspective or as a resident who loses recollection of their identity as well as their family members. It is also sad that many dementia care centers focus singularly on resident safety and basic health, but do little to address the day-to-day comforts of residents.

## The Design Approach

The design field uses their normal tool — intuition — in design for aging. The American Institute of Archi-

tects defines this “expert intuition,” as a skill architecture school students graduate with.<sup>4</sup> Yet intuition is based on common experiences, and the designer and the dementia resident have few to share.

The typical senior housing design is non-scientific with a highly decorative nature, from bright lights and loud noises to the complexity of room layouts. However, these features are beyond the residents' perception, which then forces them to use their cognitive reserve just to manage the sensory deprivation and cognitive confusion. Overall, these facilities are also perceived to feature a



THE COTTAGES

Read about the first autism facility built based on quantitative building performance sensory and cognitive complexity standards in the **March/April 2018 issue of FMJ**.



Western Home Communities has been operating senior living facilities for more than a century. During a segment of the PBS Next Avenue show\*, CEO Kris Hansen describes its newest endeavor, the Cottages, as an environment created to empower dementia patients to function at their highest capacity.

“We had to change care plans on six residents the first two weeks because they started re-engaging and eating. And we had three other residents who had become wheelchair-bound, and all of a sudden they wanted to walk.”

design that suits staff and visitors, which is not scientifically valid.

The Americans with Disabilities Act (ADA) mandates efforts for inclusive design in commercial building projects to be accessible for targeted disabilities (2010 ADA Standards for Accessible Design issued by the Department of Justice on September 15, 2010).<sup>5</sup> Physical access has long been the standard for accessible design, and it can add additional costs to the budget.

In most buildings, the percentage of occupants with perceptual or cognitive disabilities or losses — including aging, dementia, autism, mental illness, ADHD, PTSD, Sensory Processing Disorder, blindness and deafness — is at least 40 percent of the population. With almost half of the population facing limited sensory sensitivity, cognitive processing problems, and the physical problems of aging, specialized research-based design is a must. Design should now be driven by science, computer modeling, user measurement, and validation of results. The design team should bridge the gap between researcher and designer — currently, both have clear skills, but don't share the other's.

### Design & Aging

The Cottages at Western Home Communities in Cedar Rapids is the first aging and dementia project worldwide developed with quantitative perceptual building performance standards focused on the sensory deprivation and cognitive decline of aging nursing home residents with dementia. These standards focus on the majority of older residents, who are the most disabled.

Western Home Communities (WHC), headed by CEO Kris Hansen worked with AHTS Architects and a consultant on “the household care model” before the design of this facility began.



Orfield Labs was brought on board to provide the design-research consulting on aging and dementia, which included acoustics, daylighting, lighting, thermal comfort and indoor air quality.

WHC and AHTS wanted to focus on easing the tension of environments based on the user experience of those with sensory deprivation. OL spent hundreds of hours speaking with experts in aging and dementia research to determine sensory clarity, with an intended 300 percent increase in visual and aural clarity. OL also wanted to reduce cognitive complexity so that spaces were metaphorically obvious for the residents (in other words, things were easily recognizable and where they are expected to be).

The first suggestion was to consider creating a building interior that was simpler, gentler and more reflective of the low levels of perceptual clarity of the population. Interior design then moved from an old fashioned decorative focus to a much simpler design that would help older residents function

with more perceptual clarity.

OL leveraged The Architectural Research Consortium (ARC) standards, a set of quantitative building performance standards for aging and dementia that attempt to reduce all perceptual noise dramatically (noise in the acoustic, visual, thermal and olfactory domains). These standards also aim to optimize daylighting and views, especially in the resident bedroom, while controlling visual brightness. Resident confusion is alleviated by simplifying aspects of the design, which led to a simpler, consistent interior to calm elders who often wonder where they are.

To simplify interiors, no patterns or complex color schemes were used on the floors, wall coverings or furniture, which helps elders feel familiar to spaces throughout the building. New furniture finishes included simple selection of highly visible and metaphorical colors and finishes.

The resulting building was gentle, non-institutional and perceptually quiet, and it supports all areas of sensory loss while providing familiarity. The

The specific building performance standards for perception include:

#### visual

Reflectance, pattern, gloss, color, appearance, lighting level and glare

#### aural

Noise levels, HVAC noise, privacy, reverberation (liveness), footfall noise and speech interference levels

#### thermal

Temperature, drafts, air movement, humidity, thermal symmetry, MET & CLO values<sup>6</sup>

#### olfactory

Absence of noticeable smells or odors and recirculation of air

OL research-based design<sup>10</sup> is the product of more than 13 years studying perception and cognition, 20 years administering national RBD collaborations, and hosting 31 national design-research conferences.<sup>11,12</sup> This RBD work is based on more than 40 years of user experience research, including defining, modeling and measuring environments based on quantitative standards for perceptual comfort and visual design research on perceptual preference in understanding the user's feelings about the sensory design.

zen-like environment had no change in building cost to achieve the peaceful and simple atmosphere. A radical simplicity in the spaces heightened interior design's importance over the façade design. While the exterior looks welcoming and residence-like, the interior space remains high-functioning for perceptual and cognitive performance.

### Research

In 2006, OL began a self-funded, multi-million-dollar, 10-year journey to research perceptual and cognitive disabilities from a user perspective, starting with aging, dementia and autism.<sup>17</sup> This journey included thousands of hours of discussions with top academic and research experts related to each area of sensation (vision, hearing, etc.) and each of the specialized disabilities (aging, autism, mental illness, etc.). This research has shown how current designs for senior housing are counterproductive to the well-being of the residents.

Working with WHC further exemplified how many can benefit from this new design approach. What was thought of as a small percentage of disabled occupants who needed "special treatment" has expanded dramatically — approximately half of all people need similar treatment, and disability-based design is also preferred by those in the non-disabled world.


Connection to the real world is through perception and cognition, and advancing ADA means that if an individual cannot fully experience a building, then he or she does not have real access.

### Building Costs

With such positive results from the Cottages, it is imperative to align the views in more organizations and among designers to a similar design approach.

While accessible buildings are thought to be more expensive and only suitable for those with disabilities, these assumptions are not true. ADA buildings do not require different solutions for different disabilities and shouldn't be considered limiting to design choices. Design team specializations — like having far more skilled designers who specialize in senior housing or autism buildings — are not more expensive or likely to exhibit aesthetic design. These misconceptions underlie the failure to successfully approach these challenges of design for disabilities.

OL with ARC has argued that any building of modest or larger scale can be built for the disabled at the same cost as for non-disabled, including the specialized engineering and research costs. More money isn't required — more knowledge about design science for elders is.

Since buildings should function 100 percent for users, budgets should be split into two separate buckets: one for occupancy quality issues, and the other for everything else. When budget pressures arise, cuts must come from the non-occupancy quality budget. A well-designed interior is more important than an expensive façade and grand public entries — aesthetics must be about simple appearance rather than expensive finishes.<sup>7,8</sup> 

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BY ED ROSHITSH

## Owning your operations

Facility and operations management is not what it once was. What once was mostly reactive is now more proactive than ever. What once was a “just get through the day” mentality is now a “we’re looking to the future” one.

And the all-important operations professional is at the core of it all. No one knows that better than FMs. People power the places in our lives we all depend on; people whose work is often unseen and unsung. Yet without them, our school safety suffers, our patient care is compromised, our technology systems fail and our public buildings crumble.

The wealth of technology and smarter systems for facility managers, directors and technicians mean that modern operations are more connected and more effective for those they serve, a ripple effect that reaches outward into our communities.

When our operations leaders feel more empowered, they can care for our schools and hospitals, so teachers can focus on teaching and doctors on safely treating patients. They can fix failures before they happen to ensure our manufacturers keep production running. And they can improve our public spaces, so citizens reap the benefits of well-run cities.

So, what type of tools and systems make a difference to facility manage-

ment leaders and allow them to own their operations and move forward boldly into the future?

### MOBILE

Nearly 80 percent of Americans<sup>1</sup> own a smartphone, and the average person spends an average of five hours a day on their phone.<sup>2</sup> With this new wave of accessible, mobile technology has come a revolutionary approach to operations management.

Instead of the old days of “recording” everything on sticky notes, stray pieces of paper or even Excel sheets, the facilities team can now communicate much more effectively and keep better digital records. This leap in communication has transformed how facility maintenance is completed. Work order requesters are more in the loop, work comes in faster, goes to the best (or closest) technician, gets completed and documented all while they’re in the field, and the loop is closed with final automated communication back to the requester.

### USER-FRIENDLY

Today’s maintenance management systems are simple enough to be used by any smartphone user yet extensive enough to house all of the data needed to complete daily work effectively.

In all types of facilities, work is be-

ing completed and issues are being addressed more efficiently. Work is recorded on mobile devices in the field to save time without having to go back to a central location, and assets can be monitored at a new speed and detail that means downtime is minimized or eliminated. And everyone benefits from the improved environments this type of approach creates.

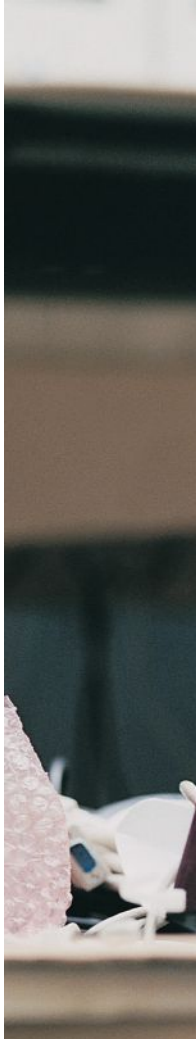
Not only are there fewer phone calls to the maintenance office or front desk, but facility professionals can feel more empowered to do work where and when they need to. Mobile timers even improve the transparency managers have into what their technicians are doing and how long projects are taking.

Smart technology gives operations professionals at all levels a leg up in their department, their organization and in their personal career path.

### PROACTIVITY PAYS OFF

Modern operations are much more proactive than reactive when teams are equipped with smart tools that alert them of potential issues or risks, and where preventive or predictive tasks are automated without even requiring the tap of a button or a perfect memory. Sensors added to equipment or specific parts can automatically inform your CMMS (or computerized maintenance management system) when a temperature is off or a meter reading should cause concern. This type of monitoring can be done 24/7, keeping work hours manageable and fire drills minimized.

The possibilities with mobile are endless and so are the opportunities for time and resource savings. Work orders can get done faster. Requesters automatically know what’s going on. Even the way safety and security





are promoted changes when everyone has a plan at their fingertips.

A proactive outlook means getting the most out of assets, equipment, employees, devices and work hours as a whole — and that's a win-win for everyone.

#### **DATA-DRIVEN**

We all know that data is everywhere, from our workplaces to our cars to our homes. And when that data can be distilled and used as a tool, it can make a big difference. This is especially true for maintenance and operations.

In operations management, we have an abundance of data on, asset history, condition and performance; work

order type, completion, time; individual staff performance; utility costs and energy use; and much more.

With all that data swirling around our ecosystems, how do we make sense of it all? The facility management team that can use insights from their data to make better decisions is the one that owns their operations.

#### **THE DIFFERENCE DATA MAKES**

Better data helps organizations operate smarter. When assets break down less and it's clear what needs to be repaired first, FMs are using their time and money more wisely. When they're more in tune with energy and utility use, they can implement changes that

make the facility a more environmentally friendly place. When they can compare what they're spending on contract work versus what it would cost to do work in-house, they can strategically build up staff as opposed to just guessing.

Instead of sweating over making the right call, FMs can confidently know what's best for operational efficiency and organization by looking at real-time data. And when that data is put in the hands of the entire team, it can help them effectively tell their story.

Accessible reporting tools and interactive charts and graphs on a simple dashboard bring daily operations

wins and challenges to life. Checking in on an operations data dashboard daily or weekly can make for a smarter manager or a more informed maintenance technician. Key performance indicators (or KPIs) customized to organization goals can help track the impact the work makes on a much larger scale. And whoever is making the call on the budget increase or resource allocation has proof points to help them make the right call.

Software providers today have decades of operations data in their systems to help users decipher how they're performing against similar organizations. Or they can better gauge what that next fix or best step is.

New operations efficiencies are waiting to be discovered when operations professionals let their data lead the charge.

## COLLABORATIVE

In the evolving world of facility management, communication is critical. Especially when talking about new and changing technologies, each tool has the potential for clear or unclear communication.

The communication points abound. Between those that are served and the maintenance staff, the stakeholders and leaders, managers and those they manage, the technicians and those they fix things for, and even work requesters and the team. Each touchpoint is important to promote the right level of service for the mission of your organization.

Think about it like a conversation. When there are easier ways to communicate and collaborate, then FMs can champion the team's efforts, share ideas and concerns, and gather support from others. Systems that encourage better collaboration are critical for efficient operations.

## THE NEW WORK ORDER

Today's work order goes through the system faster than ever. It's entered or even requested digitally with room for a full description. Then, it's assigned to the appropriate technician, so they know what to do and where, as well as the priority for getting it done. That technician can add notes and pictures to what was fixed in that same work order log, then hit complete and trigger an email back to the requester.

When people feel connected, they

## OPERATIONS & MAINTENANCE TRENDS

### Extended mobile technology

A CMMS mobile app takes advantage of the devices in employees' pockets to put the information they need in their hands. This means less windshield time and more wrench turning time. Features like camera integration allow the ability to remotely upload images or add PDF diagrams while geo-tagging enables a real-time visual map of work orders and assets.

### Pairing preventive maintenance and predictive maintenance

Preventive maintenance (PM), or performing maintenance before breakdown, is a must-have for operational success. Add Predictive Maintenance (PdM) for an even smarter way to work. While it's important to have a PM system in place to tackle recurring tasks, a PdM program can analyze data and identify trends without human intervention. It takes the guesswork out of decision-making.

### Automating work and communication

Cloud-based platforms make it possible to eliminate paper and digitize work orders, all for the benefit of making a team's job easier and more streamlined. Work order requests are automatically pushed to technicians and status is available to the requestor in real-time right through to completion. With anywhere, anytime access to information and tools, technicians are able to manage all work orders, assets and maintenance activity in one central location to simplify communication.

feel empowered. From online work request portals to mobile devices, today's teams have the systems they need to better engage with both internal and external stakeholders. And that means they can see the response and the results.

There's transparency throughout, which can lead to more celebration for those important wins and added resources (whether budget or staffing) such as when the data shows the department needs help. The facility team can have more positive light shined on their daily work, instead of only being called upon when there is an issue.

## WORK THAT MATTERS

The modern operations team can now make a greater contribution to the organization's mission — whether it's fixing a boiler so students are comfortable, keeping restrooms clean to promote health in a hospital or senior care facility, or knowing which asset really needs to be replaced to keep production running at a plant.

The more light we can shine on the work of today's operations professionals, the more we show how much their work matters in the grand scheme of things. And the more pride and purpose each employee can take in their work.

## A NEW DAY FOR FM

It's a new day for the world of facility maintenance and operations, and we're all benefitting from the improvements that these modern capabilities can make.

Technology is being increasingly designed to strengthen the facility team's core skills, not replace them. Adding to careers, not detracting from them. And the impact doesn't stop there.

The facility of the future is run by a team of operations professionals who are confident in their day-to-day work, excellent communicators equipped with mobile tools and able to interpret data to make better decisions for everyone. We can't wait to see how this grows in the future.

After all, when technology and talent combine, it creates a better world for all of us. **FMJ**

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# The VALUE of BELONGING

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Belonging to IFMA is very rewarding to me because it allows me to network with other facility managers, who share many of the same issues I face. It also allows me to mentor young facility managers and students interested in becoming facility managers or enhancing their FM skills and experiences.

– Dave Riker, IFMA Member since 2005

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BY JOHN RIMER

FMJ EXTRA  
*Resource*

Building a Robust  
FM Program



# EMERGENCY PREPAREDNESS

# A PLAN FOR FAILURE



While much of our corporate focus is on catastrophic events that grab headlines, such as active shooters and major storms, not much attention is given to the incidents that affect facilities on a routine basis. Not to minimize the tragedies that result from such events, as we should all remain vigilant in preparation and prevention, but the odds of encountering them in your building are rather slim.

An emergency or incident should be seen as any event that impedes or potentially impacts business or ability to operate normally. In addition to power anomalies — which includes sags, surges, and outages — network interruptions, HVAC failures and false alarms fall under this definition. While a sudden reduction in heating and air conditioning performance seems insignificant, the fact is, occupant productivity goes down 2 percent for every one-degree Fahrenheit the work environment strays from the comfort zone. Not to mention that worker errors increase by 28 percent when cold and 56 percent when warm.

Additionally, if the HVAC cannot meet the necessary outside air requirements, the affected space will need to be evacuated. Those are real dollars and such events lead to unpleasant phone calls FMs receive from upper management vividly expressing their discomfort and the embarrassment it caused during their important business meeting — you know you have been on the receiving end of that phone call a few times.

Or recall having to explain why the fire alarm sounded, emptying the building, because a contractor stirred up some dust performing maintenance. Or receiving a fine from the EPA for a fuel spill. While these events do not necessarily make the news, their impact surely qualifies as an emergency incident.

All that said, most facility depart-

ments grossly lack a comprehensive emergency preparedness and response program leaving them and their organization vulnerable to financial, social and environmental risks. A robust program should address prevention, mitigation, preparedness, response and recovery.

## PREVENTION & MITIGATION

Ideally, we start on the right foot by ensuring building and systems are designed and constructed correctly, including installation of an infrastructure and redundancy required to meet the organization's desired resiliency. Therefore, it is of the utmost importance that facilities participate in the design and construction process leveraging their operational experience. Additionally, facility managers should insist on commissioning for most projects to verify they receive an acceptably functioning deliverable, instead of "commissioning" it on-the-fly with the department's thin O&M dime.

Once installed and accepted, system performance is the responsibility of the facilities department. Therefore, a robust O&M program must be in place and efficiently administered. More than half of facility organizations spend at least 50 percent of their time on reactive maintenance. Ideally, the PM/CM ratio (preventive/planned versus corrective/reactive maintenance) is at least 80 percent/20 percent with critical environments pushing 90 percent/10 percent. This self-induced reactive firefighting makes facilities their own worst enemies, perpetuating some of the emergencies we are discussing.

Deferred maintenance must be minimized and mitigated through a Capital Replacement Program (CRP). Given many incidents and firefighting are

An FBI study found the U.S. active shooter incident rate at work between 2000 and 2013 averaged

**9.4 per year**

An average of five hurricanes strike the American shoreline every three years; which equates to

**1.7 per year**

Conversely, per Inside Energy, the number of power outages has been doubling every five years. From 2010 to 2013, there was an average of

**200 grid disruptions**

The U.S. Energy Information Administration determined that each utility customer will experience roughly

**1.5 outages**

per year with total durations exceeding three hours, costing companies as much as

**US\$ 150 billion per year.**

*For sources and additional statistics, see <http://fm360consulting.com/facilities-department-not-a-profit-center-but-can-it-be>.*

caused by band-aid fixes to aging equipment, the replacement of assets needs to be forecasted and budgeted to mitigate these failures. See Digging Out of Deferred Maintenance (May/June 2016 issue of FMJ) to learn more about the value of and steps to implementing a CRP.

Lastly, management must equip and encourage staff to have a risk-oriented mindset. With the prevailing legacy of cost-directed behavior, it can be difficult to shift the thought process from the cost of doing to the cost of not doing. Staff become numb to hearing “no” with all their requests to fix issues that they stop looking, because they think “What’s the point?” Facility departments need to truly realize the value the impact their actions and inactions have on the organization.

On the other hand, facility staff need to understand that it is not enough to simply identify the problem and to run it up the flagpole. Upper management likely does not have the insight to discern costs or to weigh the costs versus risk. Thus, it is imperative staff walk with their eyes wide open to identify potential issues, determine possible solutions, and estimate the cost to implement. Then the business case is recommended to management, clearly stating the risks and costs of not addressing the risk.

## PREPAREDNESS

To develop a preparedness program, one first needs to understand the organization so that priorities can be clearly established. Knowledge of stakeholders, business drivers, operational processes, locations of business units and departmental interdependencies are required information. Ideally, these are conveyed in the organization’s business continuity and disaster recovery plans. The resulting criticalities will be used to determine communication protocols and emergency operating procedures.

Current building information is a must-have to ensure an accurate and safe response. Floorplans, drawings, and system one-lines should be available and incorporated into emergency documentation. Current panel schedules, labeled pipes, and maps showing valve & disconnect locations are very useful as well. Most maintenance management

systems can house such documents.

Utilizing the aforementioned information, system specific emergency operating procedures (EOPs) are drafted. The EOPs provide step-by-step instructions for manually shutting down, restarting, bypassing, and isolating the various critical systems. For example, the steps for manually starting and transferring load to generator. A common EOP is a checklist for confirming that critical systems rode through the power anomaly and are operating as expected.

EOPs should be written in a tabular format where each row is a simple one-step task; additionally, a column should be included that identifies the expected outcome of the task. For example, it may state: turn switch to manual, amber light will illuminate and alarm will sound. Visit <http://fm36oconsulting.com/erm> to see an EOP example and template.

In any incident, the weakest link will typically be communications or the lack thereof. Thus, a succinct escalation protocol should be developed that identifies who calls the necessary stakeholders and when/how to escalate if the stakeholder cannot be reached. A mass means of communication to stakeholders is ideal so that the facility manager or engineer is not calling numerous individuals. The mass communication blast can quickly state that there was an event and provide a call-in number and time for a conference call. The facility manager or director can be the stakeholder liaison acting as the information conduit. This allows the manager to manage the relationships and the message while keeping staff free to resolve the issue.

After all the documentation is drafted and approved, staff is trained on the EOPs, escalation protocol, etc. Documents should be reviewed at least annually to ensure they are still valid and accurate. Staff should be trained on all documents annually as well.

The EOPs are great training tools for new and existing engineers. Management needs to ensure staff has the requisite training, certifications, and PPE. PPE must be available at the various locations and in the correct quantity. PPE, safety kits, clean-up kits and AEDs require inspection and maintenance or replacement, which can be scheduled and tracked in the main-

tenance management system or contracted to a third-party, as is common.


Lastly, practice, practice, practice... Host drills at least once per quarter. Most drills can be tabletop, however, a “live” event is recommended annually. The live event should involve local emergency agencies, such as fire, police, and medical. This is a great way to build rapport with first responders and to learn from each other. Various scenarios should be simulated and back-up personnel rotated in as primary. Documentation and procedures are living documents and are updated as necessary after each drill.

## RESPONSE & RECOVERY

When an event arises, staff should follow EOPs and communication protocols, ensuring their safety and that of others first and foremost. Notes should be taken by a designated person, including relevant times and communications. Leverage disaster recovery and clean-up firms as necessary.

After the event, a post-mortem analysis should be conducted to determine the root cause of the incident and to identify lessons learned. Lessons learned should be communicated across the organization where applicable and documentation, processes, training, etc. updated and amended as necessary.

## CONCLUSION

While facility folks are creative and typically think quickly on their feet, relying on such skills and flying-by-the-seat of the pants can lead to further collateral damage and reflect poorly in the eyes of the customer and management. As the saying goes, failure to plan is a plan for failure. In this case, facility departments need to plan for failure; it is not a matter of if, but when, will the next event occur? Are you and your team prepared? 



**John Rimer** CFM is president of FM360 Consulting and has over 20 years’ FM experience. He is an IFMA Qualified Instructor and presents regularly at industry events. Visit [www.fm36oconsulting.com](http://www.fm36oconsulting.com) to view John’s other articles and resources.

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# Smarter welcome, safer facility

The global smart building market is growing exponentially and is expected to reach approximately US\$6.19 trillion by 2024.<sup>1</sup> As an FM professional, it's highly probable you'll be operating at the beating heart of a new or retrofitted smart building during your career.

While the focus to date has predominantly been to drive efficiency, sustainability, customer service and comfort, an increasing demand for integrated security and safety systems is now changing the technological landscape. Cloud and physical security systems are converging to deliver maximum protection for people, assets and data.

Ask any employer to name their most valued asset and 99 percent will say: people. Physical security is in place to protect employees, yet as cyberattacks continue to dominate the news, logical security (threat management, breach detection, intrusion prevention) concerns have seen physical security take the back seat. However, whether it's guests, contractors, vendors or business partners, most organizations welcome a large volume of visitors daily onto their premises, and this represents risk.

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## AN AUTHORIZED WELCOME

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Historically, the validation process of signing visitors in has operated as a separate function to security and wider building systems. Some companies still rely on paper logbooks to do this. Whilst most visitors are

legitimate, FMs cannot afford a chink in the chain should an unauthorized person try to access a premises.

While access control for employees has become far advanced technologically, all these layers of security can be easily negated if receptionists and security guards hold open a gate or door visitors to walk through.

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## UNIFIED SECURITY PLATFORMS

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With the advent of the cloud, integration of physical access control systems with cloud solutions such as visitor management systems (VMS) is now possible. These converged solutions now play an increasingly essential role in the protection of infrastructure, both physical and virtual while also delivering a seamless customer experience.

Integrating VMS and access control is a more holistic approach to site security, tightens security policies and improves operational efficiencies. By neglecting to link VMS with physical security, buildings are far more vulnerable to security breaches. From re-using old visitor passes, or convincing the receptionist they're expected for a meeting, to tailgating employees through doors and access

barriers, non-authorized visitors use a multitude of methods to gain physical access to a building.

Consolidating entry and exit activities onto one single system provides FMs with a quicker and more accurate process of scanning and tracking visitors. As physical security and the cloud converge, a visitor pathway can be programmed and pre-authorized before arrival. Access can be as granular as a single room, a single floor at a time, and any deviations from that route can be recorded even when access is denied. Even exiting the elevator on the wrong floor can be negated — also very handy for visitors who genuinely get lost.

Historically, access control would only be accessible to employees, resulting in the need to escort visitors throughout a facility on all occasions. On the flipside, an integrated VMS/access control system can help to make visitors feel more welcome. Being escorted can be an uncomfortable experience for visitor and employee, particularly if bathroom stops are required or a quick phone call must be taken. Providing access via a specific pathway enables visitors to make their own way to a meeting, comfortably yet securely.

While it might seem easier for someone to breach an organisation's

network to steal critical data and information, physical theft cannot be overlooked. Should a threat be detected, FM, IT and physical security can now work seamlessly to lessen risk. For example, if a visitor was to remove a computer, IT safeguards can identify its movement and immediately alert CCTV and access control to monitor the situation, and if need be, even communicate a lock down with the entrance doors.

In the case of an emergency, such as a fire, the fire alarm system can trigger the VMS to send text messages to all visitors in just a few seconds with instructions and evacuation procedures.

The most important outcome of converged systems is that safety and security is maintained at all times. Should a visitor forget to hand in their badge before departure, for example, their access rights will expire on the specified date and time and the badge rendered useless should they attempt to re-enter the building.

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#### BIOMETRIC VISITOR MANAGEMENT

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The next step for VMS is integration with facial recognition technology — matching visitors with official identification at the point of check-in. Not only does this dramatically reduce the administration time of booking visitors in, it enhances security by removing potential “human error” from the ID matching process.

When linked via an IP-network (whereby individual systems and technologies have their own IP addresses), CCTV systems can also draw vital biometric data from the VMS. A surveillance camera can connect with the VMS and draw data such as visitor ID photographs which can then be matched against any unusual activity. For example, if a contractor makes several attempts to gain access to a restricted area, a camera will trigger to record and alert security personnel to the footage.

In the advent of smart cities and intelligent data, VMS can now link with external national databases such as sex offender and terrorist watch lists should this be a requirement within an organization.

# Smart technology now helps to create a human-centric workplace or building experience for employees and visitors.

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#### THE VIP EXPERIENCE

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Every legitimate visitor should feel like a VIP. While tight security is a must, a warm welcome is also vital for brand perception and comfort of visitors. Smart technology now helps to create a human-centric workplace or building experience for employees and visitors.

First impressions are vital. In business, the first impression can literally mean the difference between getting that contract or not. It’s the difference between the client trusting you and your business or feeling that it wasn’t for them. Smart technologies can help FMs and employees extend a warm welcome to clients and give them that all-important edge over the competition.

From the moment a visitor arrives, smart systems now work together to deliver a VIP experience to all. For those driving in, car park CCTV systems can now tap into VMS data and pre-authorise car registration plates to help with a smooth arrival. Parking permits/access codes can also be sent in advance automatically via the VMS app or email.

Meeting data stored by the VMS can be shared with multiple services such as room management software and catering. Factors such as noise level, lighting and heating can all be pre-set to ensure the room conditions are optimal upon commencement of a meeting and efficiently shut down on exit. Even beverages and food can now be pre-ordered by visitors, stored in the VMS and transferred to hospitality before arrival.

It is exciting to know this is only the beginning of the “proptech” era. While we might not be welcoming staff and visitors by smart motorway or delivering hot drinks by drone just yet, in the visitor management space, at least, 2018 and beyond will see the corporate world finally connect the dots between the technological experience customers ex-

pect when they visit corporate premises and the apparent “disconnect” there has been to date. As smart cities are created, and visitors utilise the latest technologies such as high-speed rail, driverless cars and smart motorways, archaic front-of-house experiences are likely to create a negative impression.

Embedding smart systems will ultimately help FMs redefine their role to one that is more strategic, freeing them from the daily grind of monitoring individual systems and managing multiple suppliers. To achieve this, stronger partnerships between FM, IT and security teams are imperative. There needs to be a deep understanding of technology, people and processes, which can only happen when links between IT and security heads are strengthened. And the result? A robust and shared approach to threat and optimal protection of people, assets and data. **FMJ**

#### REFERENCES

1. <https://globenewswire.com/news-release/2018/03/20/1442408/0/en/Global-Smart-Building-Market-Expected-to-Reach-USD-61-900-million-by-2024-Zion-Market-Research.html>



**Gregory Blondeau** is MD and Founder of Proxyclick, a web-based software company that

manages your office visitors. Proxyclick has managed close to 10 million visits in more than 50 countries and counts among its users 26 Fortune 500 companies. Some of its most well-known clients include Airbnb, L'Oréal, Danone, Bosch, BASF, Audi, Acer and PepsiCo. Proxyclick accompanies corporations in their front desk digitization quests, taking into account three key concerns of both companies and individuals: visitor experience, building security and data privacy. Proxyclick has headquarters in Brussels, Belgium and offices in New York.





## 2018 Foundation Scholarship Program update

The IFMA Foundation supports aspiring and practicing FMs in their efforts to reach higher, go farther and make a difference.

Each year, the Foundation's scholarship sponsors make it possible to award 35-40 students studying FM and closely related careers. Scholarship sponsors come from around the world and are IFMA Chapters, IFMA Councils, FM solution providers and other FM organizations Since 1991,

the Foundation has awarded more than US\$1.5 million to hundreds of aspiring FM professionals. These scholarships change lives and are a principal strategy and creating the next generation of FM professionals.

This year, we were amazed by the number and variety of student applications from different countries, different schools and the applicants' fields of study. We also received more Ph.D. candidates than ever before.

Individual scholarships range in value from US\$1,500 to US\$10,000, and are awarded to undergraduate (two-year and four-year) and graduate students enrolled in facility management or FM-related programs. In addition to the scholarship value, recipients also receive fully funded travel, accommodations, meals and registration to attend IFMA's World Workplace.

2018 scholarships will be announced at the Foundation Fundraiser on Tuesday, Oct. 2, in Charlotte, North Carolina, USA.

### Number of applicants: 59

### Applicant degree programs:

Associate degree: 2  
Bachelor's degree: 27  
Master's degree: 21  
Ph.D. candidates: 9

### Applicant fields of study:

Architecture  
Building Construction/Construction Management  
Business  
Design Engineering  
Energy Systems Engineering  
Facility Management/International FM  
Interior Design  
Land Economy  
Real Estate Development  
Urban Planning & Architecture

### Colleges and universities

represented: 32  
Arizona State University

Catholic University of America  
Chaffey College  
Colorado State University  
Concordia University  
Conestoga College  
Ferris State University  
Florida A&M University  
Georgia Institute of Technology  
Hague University of Applied Sciences  
Harvard Graduate School of Design  
Heriot-Watt University  
Hong Kong Polytechnic University  
Iowa State University  
Indiana University Perdue University at Indianapolis  
Kennesaw State University  
Kwame Nkrumah University of Science and Technology  
Kyung Hee University  
Massachusetts Maritime Academy  
Mount Royal University  
New York City College of Technology  
New York Institute of Technology

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Texas A&M University  
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**For a list of the 2018 IFMA Foundation Scholarship Sponsors, please visit the foundation website at <https://foundation.ifma.org>.**



# LIGHT AS AIR

AIR CASTER TECHNOLOGY LIGHTENS THE BURDEN OF MOVING MOUNTAINS OF EQUIPMENT

For facility managers, the task of moving heavy products or equipment in a manufacturing facility is a daily challenge. It can be accomplished using cumbersome, old methods, or it can be done with greater ease through technology enhancements.

While the challenges of moving heavy equipment may vary somewhat from industry to industry, their solutions are similar. Surprisingly, FMs can apply the same technology for moving a diesel engine or airplane fuselage section to moving massive seating sections at a sports or theater venue. Day in and day out, FMs seek to help their organizations find ways to save time and money, improve safety and add value to ensure the efficiency of their organizations. In the process of relocating or reconfiguring, many have discovered the solution is to use air caster technology in any of these disparate venues.



Argonne National Laboratory used an air bearing system with power drives to move long and heavy equipment into the facility.

#### **What is air caster technology?**

Very simply, air caster equipment uses a variety of air bearings to float very heavy (5- to 200-ton) loads on a thin film (.003 to .005 inches or .08 to .13 millimeters) of compressed air.

#### **Where can air caster technology be applied?**

Air casters have been successfully used in construction, manufacturing, aerospace, entertainment, shipbuilding and a variety of other industries.

#### **How do they work?**

In any manufacturing plant, huge, heavy components can be assembled on top of air caster-supported platforms. As components, machined parts or complete assemblies are added to the manufactured or constructed part, the enhanced product is glided along the floor on the air casters like “hovercrafts” making heavy products very easy to maneuver. Omnidirectional movement of partial or completed pieces — buses, engines, tractors, and other large equipment — can be safely handled with a few workers (the number depends on the size and weight of the piece) and without the use of space-taking permanent fixtures such as cranes, conveyors, rails or other equipment.

## ADDED VALUE

How does a production facility optimize floor space, minimize costs and maximize productivity against the opposite forces of a fixed plant configuration, a non-expandable manufacturing footprint and pre-existing crane or rail structures? They look for proven, effective methods and innovative options.

For example, today's heat exchangers are heavier, taller and wider than they

were in the past. These larger versions often don't fit in some existing buildings. They tend to be too tall for yesterday's ceilings and they're too heavy for the older cranes typically used to move and place them. Blasting out walls, raising ceilings and installing bigger, higher-capacity cranes are all expensive and unnecessary solutions. Sometimes the answer is not only simple, but also safer and less expensive as well.



*Airplane manufacturing was the first industry to capitalize on air bearings as a flexible and safe load movement method.*

## AIR CASTER TECHNOLOGY

Air caster technology offers easy-to-use equipment and has proven itself in venues ranging from heavy manufacturing (e.g. aerospace) to modular building (apartments and modular hotels) to entertainment venues (sports arenas and theaters).

Without stopping a production assembly line, the part can be gently pushed and maneuvered off the line without interrupting flow. Cross-bay movements are simplified. Manpower is optimized. Floor space productivity is maximized. Safety is assured.

For entertainment venues, air caster technology is used in moving entire seating towers and bleacher sets. Add-

ing or subtracting hundreds of seats and changing the feel of an event can be accomplished safely using special, durable air casters for both inside and outside auditoriums and arenas.

## TECHNOLOGY BENEFITS

Air caster transfer methods provide expanded capabilities for facility managers.

Not only can FMs respond to increased demand with complete movement flexibility, but air casters allow omnidirectional movement of any weight without halting flow and often with just a few employees. Because of these benefits, increased demand can be more easily assimilated into the workflow.

# FM CHALLENGES COME FROM MANY DIRECTIONS

## Increased demand

Demand for goods and services grows with swelling world populations.

## Higher labor costs

Technology often complicates hiring; plus, operational and safety training adds to payroll burdens.

## Just In Time (JIT) pressures

As global needs for JIT inventory and JIT market delivery rise, efficiencies in all areas are welcomed.

## Cost-saving requirements

Expanding the manufacturing footprint to reduce costs while increasing production strains budgets and ingenuity. Re-building or expanding is expensive and often prohibitive.

## Heightened quality control

Mistakes and re-dos are costly. Emphasizing quality is part of the FM's responsibility.

## Safer manufacturing facilities

Safety is good for humans and good for the business.

NOT ONLY CAN FMS RESPOND TO INCREASED DEMAND WITH COMPLETE MOVEMENT FLEXIBILITY, BUT AIR CASTERS ALLOW OMNIDIRECTIONAL MOVEMENT OF ANY WEIGHT WITHOUT HALTING FLOW AND OFTEN WITH JUST A FEW EMPLOYEES.



Factory machinery is positioned using air bearings permanently mounted under the structure.

## TECHNOLOGY BENEFITS

### Lower labor costs

—  
Air caster technology may require fewer workers on the manufacturing floor. Learning to use air caster equipment is easy. There are no licensing costs as for forklifts, cranes, etc.

### Just in time delivery is enhanced by air caster flexibility

—  
Moving manufactured pieces around the line makes the production more fluid and capable of mid-stream changes. Manufacturing of even the largest of items becomes more efficient and responsive to market swings and production demands.

### Fewer expensive load-moving machines required

—  
Cranes, conveyors and rails take space and are expensive to operate. Air caster technology requires no permanent structures and uses existing compressed air. Installing permanent equipment, such as cranes, rails, etc., to achieve expansion or growth goals becomes unnecessary. Air caster-enhanced carts, jacks, lifts, vehicles, etc. can be moved from one part of the production floor to another, from one building to another, or from one part of the country to another.

### Consistency and quality control

—  
Using air casters improves consistency and quality in many industries, allowing units to be easily pulled off line for additional inspection, repair or alteration.

### Increased safety, reduced damage

—  
Air casters are low profile, close to the ground, thereby avoiding drops. Movement is deliberate and controlled, averting dangerous swings and worker injuries or damage to units and to floors, walls and ceilings. Overhead crane accidents are eliminated. Training is minimal. The operator's view is unimpaired.

## FROM "A TO Z"

Competition in any industry is fierce. Opening one's mind to opportunities outside of the traditional solutions requires attention and experimentation. Yet, there's no need to try the untried. Sometimes, as Steve Jobs said, it's just a question of "think different." Air caster technology lets the FM professional think differently. Proven safe, flexible and cost-efficient, application of air caster knowledge and technology can make a difference and handle growth and expansion through the decades to come. **FMI**

**Paul Jakse** is vice president sales of AeroGo, Inc., Seattle, Washington, USA. AeroGo manufactures heavy load equipment utilizing hovercraft and wheel technology for moving heavy, awkward or delicate loads in factories. For more information, please visit [www.aerogo.com](http://www.aerogo.com).



An overhead crane places the Orion module on a work stand, which uses compressed air to "float" the spacecraft through a NASA facility.



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BY JOHN MOSHER

As we consider the future of the built environment, one of the most dramatic changes will be the way we generate and consume electricity. The challenge to decarbonize our energy supply has created a myriad of opportunities for new ways to generate, manage and consume power.

Over the last decade, clean energy technologies like solar and wind have been complimented by super-efficient technologies like LED lighting and new heating and cooling technologies, resulting in lower costs for consumers and fewer emissions. Energy storage is the critical third leg of this stool, the lynchpin that enables more rapid penetration of new efficiency technologies and clean energy generation.

**Why energy storage matters**

Electric power cannot be stored; it requires the overbuilding of our energy systems with a vast amount of expensive, and often dirty, capacity waiting on the sidelines ready to be called upon during periods of peak demand. For example, a recent study by the Department of Energy Resources in Massachusetts (USA) calculates that the top one percent of peak energy demand for the state represents 10 percent of the overall supply costs and that the top 10 percent of peak demand represents 40 percent of total energy supply costs.

Energy storage gives grid operators much more control in managing their load. Batteries can be charged in periods of low demand and deployed when energy is needed. It also allows energy resources to be located closer to where the

energy is required, relieving congested nodes on the grid and reducing the need to upgrade distribution systems.

In recent years, as the world has begun to address the carbon intensity of electric power supplies, we have seen a significant deployment of clean energy generating sources. Much of this new capacity has come from solar and wind energy which are “intermittent” resources, meaning that they produce power dependent on the wind blowing and the sun shining. At higher levels of penetration, intermittency can create additional burdens for managing the grid — not producing enough power when it’s needed or producing too much power when the grid cannot accommodate it.

A well-known pattern of solar energy production is called the “duck curve” where solar energy systems deliver maximum output during the middle of the day, but then trail off as the grid hits its peak in the evening. Energy storage can help to balance these intermittent resources and smooth out load problems like the duck curve.

Another important benefit of energy storage is resiliency, as a battery system can allow a facility to continue operations during a power outage. This is especially important for critical infrastructure like hospitals and public safety facilities. Traditionally, these facilities have often relied on diesel generators for backup power, but with the penetration of on-site solar, declining battery costs and the ability to avoid demand charges, storage is becoming an attractive and cost-effective option to enhance resiliency.

With the expense of building a grid that needs to ramp-up on a moment’s notice to meet demand, and a growing amount of intermittent generation sources from solar and wind, the ability to store energy becomes much more urgent. Historically, batteries have been too expensive to displace peaking assets on the grid, but with the plummeting costs of batteries this is rapidly changing and may be readily available sooner than many think.

## Deployment at Utility Scale

In European countries that were early adopters of storage-friendly policies, energy storage has seen robust market penetration. According to Energy Stor-

age News, 300 Megawatt (MW) hours of energy storage was installed in the EU in 2015 which grew to 700 MW hours installed in 2017. Roughly 60 percent of the total installed capacity is utility scale. These are larger projects that benefit from scale efficiencies and are often referred to as “front of the meter.” This means it is a standalone project that feeds power directly into the grid. Commercial and Industrial (C&I) projects are often called “behind the meter” as they sit behind the meter at a facility and provide on-site energy with benefits going directly to the energy consumer.

## C&I market growth

A recent study by Delta Energy and Environment predicted that by 2021 up to 210 MWs of energy storage would be installed annually in Germany and the UK for C&I markets; this would be ten times the 22 MWs installed in 2016. Like Europe, the U.S. has seen initial market penetration at the utility scale. However, behind the meter systems are expected to see tremendous growth in the next few years. A report by Green Tech Media and the Energy Storage Association forecasts the U.S. C&I market to grow 15 times its current size in five years (by 2023) reaching 3.3 Gigawatts (GW) of new annual capacity. By 2019, it is expected that behind the meter projects (residential and C&I) will comprise 50 percent of the new capacity.

## Behind the boom

To understand why C&I facilities are expected to see such rapid rates of adoption, we need to take a closer look at how C&I customers are charged for their energy. Typically, utilities charge commercial customers in two different ways. The most well-known is volumetric charges, i.e. how much energy is consumed over a period of time. This is calculated in terms of kilowatt hours (kWh). However, because of the expense of managing peak demand, many utilities will also send economic signals that encourage consumers to “flatten” their load; i.e. avoiding dramatic energy surges that will trigger the need to call upon more expensive generating assets.

The most common way utilities send these signals is through demand charges.

Although these charges can vary in the way they are calculated, typically a utility will look at a consumer’s peak load each month for a short duration of time, usually a fifteen-minute window. The demand charge is calculated by taking the peak usage for each month and multiplying it by a certain rate. Unlike energy consumption charges, demand charges look only at a snapshot in time, and thus are based on kilowatts (kW) as opposed to the volumetric charges which are based on kilowatt hours (kWh).

For example, a small manufacturing company may have a big order due at the end of the month and utilize all of its machinery in a short period of time, causing a spike in its energy consumption. Let’s say their typical load is 750 KW but during the end of month surge it ramps up to 1200 KW. The rate for demand charges can vary from zero to as high as US\$50+/KW. Let’s assume US\$40/KW for this example. This would translate to a monthly charge of US\$48,000, just for that one spike in energy consumption. Typically demand charges are anywhere from 30 to 70 percent of a customer’s bill.

## Commercial-scale storage

High demand charges send price signals that are accelerating the energy storage market. In order to mitigate these charges, facility and energy managers are looking for ways to even-out their load profiles. At the same time, commercial energy storage systems have rapidly declined in price, making storage an attractive option today. In fact, according to a study by the Clean Energy Group and the National Renewable Energy Laboratory (NREL), installing an energy storage system makes economic sense for customers who are paying more than \$15/kW in demand charges. Based on this threshold, NREL determined that energy storage systems would make economic sense (two- to five-year payback) for five million commercial customers in the U.S. As policy makers establish incentive programs for energy storage, the numbers will become even more compelling.

In another study, NREL looked at two specific case studies for commercial facilities to determine the potential value of an



energy storage system. The first project was in Los Angeles and looked at a storage system paired with photovoltaic (PV) solar energy, and a second project in Knoxville, Tenn. that only had a battery system. Based on the potential performance of a lithium ion battery system, both projects had a positive Net Present Value (NPV): US\$31,874 for the Los Angeles project and US\$60,731 for the project in Knoxville.

### Energy Storage Incentives

Like Europe and other global markets, the rate of penetration for energy storage is dependent on government policies to jump start the market. In Europe, first Italy, then Germany and then the UK each created rapid growth as they rolled out storage-friendly policies. In the U.S., early stage markets are driven by state policies with the leader being California where a rebate program called the Self Generation Incentive Program (SGIP) drove 45 MW of new installed storage capacity for the C&I market in 2017. More recently, New York, New Jersey and Massachusetts have all launched new storage incentive programs. Of course, federal policies are also important and customers who co-locate storage with solar will be able to take advantage of the 30 percent Investment Tax credit and accelerated depreciation.

### Types of Energy Storage

Energy storage can come in multiple forms. Systems can range from pumped hydro to compressed air systems. For commercial facilities, the use of thermal energy storage can be used where buildings are heated or cooled during off-peak hours when electric prices are cheaper. Ice systems exploit the same arbitrage opportunity. Flywheels have been deployed to help with frequency modulation on the grid, and flow batteries have the potential for longer-term storage requirements. For electrical power and the demands of the C&I market, lithium-ion batteries are currently the technology of choice. These systems are produced by reliable OEMs, require little maintenance and are easily installed at a commercial facility. Their “energy profiles” match well with storing energy from the grid or a solar energy system and then deploying that

energy over shorter period to mitigate the demand charge by “peak shaving.”

### Intelligent storage

The preferred technology for C&I applications is a lithium ion battery. Although we are still seeing innovations in manufacturing that are driving down costs, the performance characteristics and longevity of lithium ion are well understood and predictable. However, a battery needs an operating system to tell it what do. This system needs to be sophisticated enough to understand when the facility load is at its peak and when to deploy its energy. Most commercial battery systems come with their own integration software or can be combined with other energy management software.

Over time, these systems will become increasingly sophisticated to factor in a variety of variables such as market pricing signals, time of use rates or even predictive models using weather, load and other data. This is called demand monitoring and many C&I customers are installing these software systems, even without storage, because it gives them in-depth insight into their energy load and the ability to control it.

### Pairing Solar and Storage

When combined with a solar energy system, energy storage essentially allows a facility to be self-sufficient in that it can generate its own power, store it and use it as needed. However, the economics at this point do not favor disconnecting from the grid. The sizing requirements for a storage system large enough to be independent of the grid does not yet make economic sense in most market conditions.

Instead, energy storage systems designed to lower costs through demand mitigation (reducing demand charges by reducing load spikes), arbitrage (for facilities with time of use rates) and backup power that keep facilities fully operating for a limited amount of time are preferred. As policy makers continue to leverage the benefits of distributed generation and storage there are likely to be more opportunities for facilities to monetize their systems. This will give facility managers even more flexibility with their energy choices down the road.

### Exploring the advantages

Across the globe, policy makers are recognizing the benefits of energy storage and this is reflected in aggressive market forecasts. The large, complicated energy loads of commercial, institutional and industrial facilities are ripe for storage deployment. In turn, the benefits to these entities include more control and optionality with their energy strategies, increasing their resiliency and helping them to achieve their sustainability goals.

However, for FMs who are interested in pursuing these benefits the initial steps can be daunting. The best choice will be dependent on specific incentives, tariff structures and load profiles. A reputable energy company should provide a basic assessment free of charge. That assessment should indicate the potential for savings, and more in-depth analysis is often done for a fee or a shared savings model. Understanding the options is the first step in lowering bills and the carbon footprint while building resiliency and control. FMJ

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**I N N O V A T I V E**  
**Products & Services**



## RAM USA wins JLL SODA award for innovation

Roof Asset Management USA (RAM USA) received the 2017 Supplier of Distinction Award (SODA) for Innovation by global real estate services firm Jones Lang LaSalle (JLL) for the second year in a row.

The award showcases the industry's leading vendors that help deliver the highest caliber of service, value and innovation to JLL's clients. Over the last six years, JLL has engaged RAM USA to conduct innovative aerial infrared scans, visual roof surveys and façade inspections. Once the building evaluations are complete, RAM USA writes the specifications and performs bid and project management services.

RAM USA is a roof and building envelope consulting and engineering services firm focused on cost-effective asset management solutions. RAM USA's unique condition-based approach is based on information, implementation and continuation, empowering property managers and building owners to proactively deploy services to reduce capital, O&M and energy expenditures, while extending the life of assets.

– VISIT [ram-usa.com](http://ram-usa.com)

## PRO-TACT® ballistic barriers add safety benefits to lobbies, check points and workspaces

Pioneering visual-display and writing-surface manufacturer Claridge Products has launched PRO-TACT® ballistic barriers, an extensive range of bullet-resistant, modular, space-dividing panels for public spaces where increased safety is required.

As unobtrusive as any commercial office dividers, PRO-TACT ballistic barriers integrate discreetly into any interior environment, while providing enhanced protection for a building's occupants and visitors.

Panels and all joint connections in the stationary model have been UL 752 Level 7 and 8 certified and independently tested to NIJ Level 3. Claridge designed the barrier to achieve dual UL certifications, as UL 7 poses a greater threat than either UL 8 or NIJ3 for certain ballistic materials.

Panels are bi-directional and

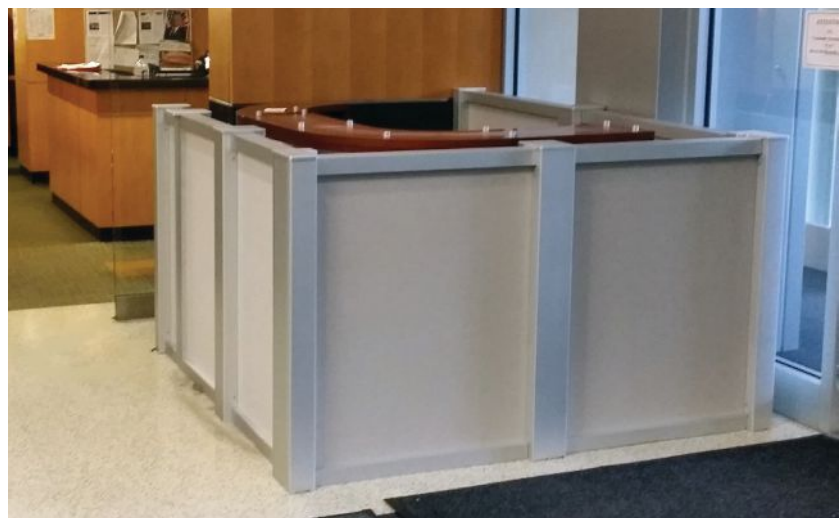
contain a high hardness steel core coated with 100 percent polyurea elastomer to lessen ricochet, spall and splatter.

Panels meet ASTM E-84 Class A, and have been GREENGUARD certified for indoor air quality.

Finished surface options include porcelain enamel steel markerboard or tackable fabric surfaces in a choice of 10 colors.

Since its founding in 1947, woman-owned Claridge Products has grown to be one of the world's largest and most respected U.S.-makers of visual display solutions. Claridge serves and supports customers in specialties ranging from architectural design and construction to business, K-12 education, health care, higher education and other industries.

– VISIT [claridgeproducts.com](http://claridgeproducts.com)



Available in stationary and mobile models, PRO-TACT panels are designed for secure environments such as military installations and recruitment centers, airports, worship centers, courtrooms and schools.

## Zadara announces GDPR-compliant STaaS solution

Zadara's award-winning storage-as-a-service (STaaS) Storage Cloud and VPSA® services adhere to the European Union's (EU) new General Data Protection Regulation (GDPR), providing corporate enterprises, service providers and other entities doing business worldwide with a simplified path to completing regulatory compliance.

The GDPR (Regulation EU 2016/679) is a new European privacy law that protects EU citizens' right to privacy. It introduces robust requirements that will raise standards for personal data privacy, protection, security and compliance. The regulation is the significant reform to data protection law in 20 years, and will globally impact all organizations processing EU subjects' data.

Zadara Storage Cloud and VPSA services offer a wide set of controls to assist customers with their GDPR compliance, including:

- » Highest level of physical security with biometric locks on Zadara's equipment cages
- » Strict role-based access control
- » Secured management communication that is always encrypted
- » Data-at-rest encryption with customer-owned keys
- » Data-in-flight encryption for any data movement
- » Robust identity management with dual-factor authentication
- » Customers can select the region where the data is kept
- » Multitenancy with complete networking and resource separation among tenants
- » Data deletion and drive shredding when the data is to be removed

Zadara conducts ongoing security testing of its Storage Cloud and VPSA services, and maintains security certifications such as ISO 27001, SOC 2 Type 2, and HIPAA. These certifications and audit reports can be used for customers' risk assessments and help them determine that the proper security measures are in place.

Zadara's Storage Cloud can be deployed at any location, supporting any data type and connecting to any protocol. The VPSA Storage Array service provides enterprise SAN and NAS, while the VPSA Object Storage service delivers private object storage. Zadara is available via on-premises-as-a-service and through a variety of partners including Amazon Web Services, Microsoft Azure and Google Cloud Platform.

– **VISIT** [zadarastorage.com](http://zadarastorage.com)



## New drain gets water (and weight) off the roof faster

OMG Roofing Products introduces a new line of retrofit roof drains called Hercules-Plus, featuring integrated vortex-breaker technology, which helps improve drain performance by improving water flow off the roof and greatly reduces the chugging effect that occurs when a vortex collapses, which can overload the plumbing system. An added benefit to faster water removal is quicker elimination of excessive weight from the roof.

Ponding water weighs approximately five pounds per inch, per square foot – just one inch of water covering 20 square feet of roof weighs 2,000 pounds. “That’s an additional ton of live load added to the building’s roof, and not entirely uncommon given the number of extreme weather events we’ve seen in the past few years,” said Dan Genovese, product manager with OMG Roofing. “The new Hercules-Plus RetroDrains can get that water and excessive weight off the roof faster.”

Hercules-Plus RetroDrains are available in four sizes, with an optional TPO or PVC coated flange for direct membrane attachment. Strainer domes are made of heavy-duty cast aluminum, which will not rust. And the safety-yellow powder coat makes the Hercules-Plus strainer domes highly visible to help minimize rooftop trip hazards.

– **VISIT** [omgroofing.com](http://omgroofing.com)

## INNOVATIVE Products & Services

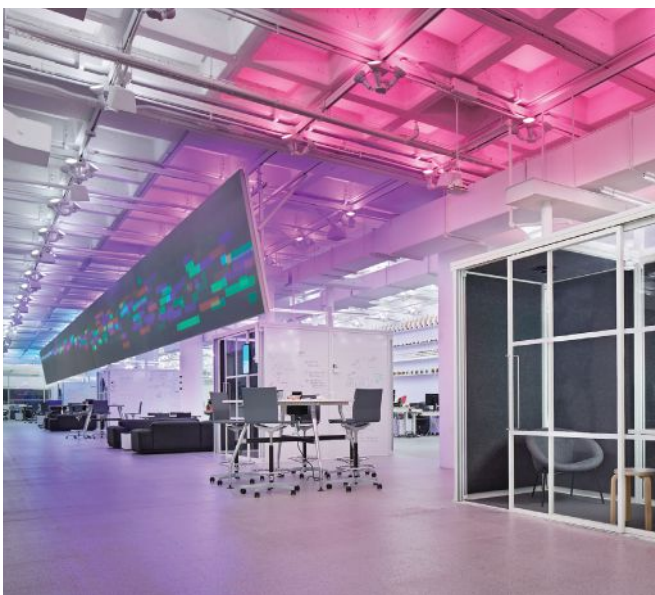
### Lutron Electronics acquires Ketra, maker of smart lighting and controls

From light dimmers for the home, to lighting management systems for entire buildings, Lutron Electronics offers more than 15,000 products, sold in more than 100 countries around the world. In a first-of-its-kind acquisition for the company, Lutron has acquired Ketra, the Austin, Texas, USA, startup that made waves in the lighting industry for creating solutions that mimic daylight.

Ed Blair, Lutron senior vice-president, said it was a natural extension for Lutron to expand its product portfolio with Ketra light sources and controls. "This acquisition allows Lutron to take care of its customers with the most comprehensive portfolio of light control solutions in the industry. Moreover, it uniquely positions Lutron for the greatest success in the market's areas of growth, like simulated natural light, smart homes and buildings and tunable white," said Blair.

Ketra's selection of light sources creates high-quality white, pastels and saturated colors, which enhance the look of any space and allow you to precisely tailor the light to meet the needs of the space. Ketra light sources are compatible with the Lutron HomeWorks QS total home control system and Lutron Quantum total light management system.

– VISIT [lutron.com](http://lutron.com)



### The only sit-stand solution for cubicles

Standing inOvation brings true sit-stand functionality to office cubicle systems. The patented design hooks directly into a cubicle frame, so you can reuse your existing work surface, which saves money and reduces waste. The system is strong, stable and leaves the under-desk space completely free. No cross-bar hitting your knees as you sit, and no instability when you mount computer monitors to your work surface.

Standing inOvation's goal was to design a kit that would bring sit-stand functionality to cubicle users everywhere, regardless of their cubicle's make or model. The hook system is compatible with about 80 percent of every cubicle system ever made. To cover the remaining 20 percent, the company built alternate hooks to work with even the most unique cubicle systems.

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# Ask the Experts

In each issue of FMJ, IFMA's Facility Management Consultants Council shares some commonly asked FM-related questions accompanied by advice from top FM consultants. The questions and answers presented in this section align with IFMA's core competencies following the themes outlined for the given edition of the magazine. **While the following answers are intended to be helpful, these responses should not be deemed complete and are limited in context by the space allocated. Please contact the individual consultants directly for further explanation of the opinions expressed.**

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**CONTRIBUTED BY**



The Facility Management Consultants Council (FMCC) represents more than 300 FM consultants from various countries around the globe. Its mission states, "The FMCC is the resource and voice for facility management consultants worldwide to leverage our collective expertise to benefit IFMA members, and the facility management profession."

Ashley has just been hired as the new facility manager at a major insurance company. She is responsible for all soft and hard services for a corporate headquarter campus housing 2,500 employees. She has found that the FM department is perceived as under-performing and delivering poor customer service. Her predecessor had not conducted a customer satisfaction survey in several years. Ashley wants to change the perception of her stakeholders. She intends to start with a new customer satisfaction survey. What advice would you give her?

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**A:** In today's customer-centric FM marketplace, it pays to see your customers as actual partners, as it will help you build a more effective and sustainable business. By using customer satisfaction surveys to obtain their feedback, you are using an effective method that will evaluate your service offering as well as make improvements by driving positive change.

First, set a goal for your survey. Start by asking yourself, what exactly do you want to know?

Below are some best practices you should think about when developing your customer satisfaction survey:

Ask relevant questions with clearly defined objectives. Your survey needs to be easily understood and you should limit your participant's effort as much as possible. Doing so will add focus to your survey, keeping your participants engaged and providing useful feedback.

Build loyalty and credibility by asking survey participants to help you understand what you could be doing better for them. Turn unhappy customers into supporters by showing them that you are listening and taking into consideration their feelings, needs and issues.

Ask your participants questions according to each of the situations or interactions they may have had with your team.

A well-designed customer satisfaction survey will result in actionable insights which will help your FM business continue to grow and innovate.

**Greg Sherwood**

*Managing Director, Integrated Facilities Management,  
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**greg.sherwood@cushwake.com**

**A:** Don't re-invent the wheel. Ask your fellow IFMA members if they have a satisfaction survey that they have used. Work with your execs and HR in editing it. Also find out what metrics your executives would like to have and craft most of your questions around those metrics. Get the blessing from management before you send it out. Your architect can also be helpful in crafting some of the questions. Use Survey Monkey or something like it. Administer the same survey before and after the problems have been fixed or before and after a major renovation or relocation project so you can measure the differences between the responses in the surveys. That also becomes a valuable metric.

**Richard Fanelli**

*AIA, CFM, IFMA Fellow*

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**A:** Ah, yes, the good old start-with-a-survey gig ... Ashley, don't do it. First, you don't know what questions to ask or how to frame them for 2,500 people in the FM dark. If you go looking for answers rather than data, you won't comprehend what you get back (and likely a low percentage). Everyone's looking to see what the "newbie" will do, so remember that facility management should be a "contact sport." Visit each major department's staff meeting with a 30-minute "here's what FM does and who I am" presentation.

Then start with 10 to 12 small focus groups of 6 to 8 people each and make them representative of different departments and job levels. Select a few questions that will stimulate 60 minutes (no more) of conversation ... and wear a flak jacket. The goal is not to answer their questions but to solicit facts and feelings. The results will help you understand their (a) definitions, (b) roles/responsibilities, (c) expectations and (d) good/bad examples.

From this, you can formulate questions that will garner more useful information. Break your FM role into discreet buckets with a couple of sentences of explanation for each, then pose your questions. Use a 1 to 5 scale, not 1 to 10 ... the vast majority of people prefer and relate to the former. When you develop a survey, pre-test it with a couple of your focus groups and determine if it's workable; don't be reluctant to make substantial changes.

Finally, give people an incentive to return the survey and plan how you're going to PR the findings in a clear manner — both the highs and lows. I suggest you report the results for a distinct bucket every one to two months. One dump is too much.

Finally, while that's going on, begin formulating your goals and roles, metrics and communications. Stay in the limelight focused on their needs, not in the back room with yours. Good luck, Ashley!

### **Dr. Doug Aldrich**

*CFM, IFMA Fellow*

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*Questions regarding the Ask the Experts section of FMJ can be directed to Mark Sekula, IFMA Fellow; CFM, FMP; LEED AP; president of Facility Futures, Inc., at [msekula1@wi.rr.com](mailto:msekula1@wi.rr.com).*

**A:** Stakeholder perception is a tricky thing to manage at the best of times, let alone having one's enthusiasm for a new job tempered by unfavourable feedback inherited from your customer base. The fact that formal feedback has not been polled for a number of years means the foundation for service improvement by Ashley could — if not addressed — rest on vocalised anecdotal information.

Notwithstanding this, my advice would be for Ashley to not issue a satisfaction survey, certainly not before she has started to build relationships with her key stakeholders. I would instead suggest conducting a series of focused conversations with key stakeholders around their perceptions and observations. Ashley needs to separate their potential emotion from fact and get to a state where corrective actions can be agreed upon that might also include how and when to introduce a future survey tool. Ashley's choice or identification of key stakeholders will require a mapping exercise.

Basic information for this stakeholder map could be secured via Ashley's FM team. While potentially being part of the problem, her FM staff need to become part of the solution and getting them to help her to identify a number of key/priority stakeholders is a good start. Once Ashley has a handle on who to speak with and has established dates and times to meet, the focused conversations can commence.

First things first — Ashley should agree with her stakeholders on the time period over which feedback is being sought. Is it over a several-year period or is the focus more recent, say the last one to two years?

In her conversations, Ashley should initially allow her stakeholder to be personally reflective. For example, tease out personal experiences and doubts. Even ask them to share (if possible) what emotions they have been experiencing. Then focus them on being more objective by getting them to reveal what has actually stood out to them recently, maybe what lines of dialogue they recall and what behaviours they have observed. Ashley can then steer her stakeholders to be more interpretive by asking questions that tease out any emerging insights, including what the critical issues are (or have been) together with what they think are the options ahead. Finally, Ashley should encourage decisions by asking them what should be done differently and exploring their individual and collective resolve to support change.

Ashley could conduct similar conversations with her own team and analyse common themes and/or issues prior to drafting a change strategy. This strategy would be shared with her stakeholders and a change plan co-developed to include milestone events, performance measures and eventually a service level for her team. Over time, this service level could become two-way.

I would lastly encourage Ashley to document all outcomes from these conversations for future reference and reporting.

### **Graham Constable**

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# ENHANCING CRITICAL INFRASTRUCTURE RESILIENCE WITH COMBINED HEAT AND POWER

The energy landscape is constantly changing. For facility managers looking for a way to improve resilience, decrease carbon emissions and help stabilize fuel use costs, Combined Heat and Power (CHP), also known as cogeneration, is a highly efficient approach to providing electric and thermal energy to facilities that has been in use for decades. Building owners and facility managers have long recognized the operational cost savings and energy efficiency benefits of CHP to simultaneously produce electric and thermal energy from a single fuel source on-site. CHP makes up about 8 percent of generating capacity in the United States and averages 11 percent of generating capacity in G8+5 Countries. Much of the installed capacity is in the manufacturing sector, though there is significant growth in other non-traditional CHP sectors.

BY MARINA V. BADOIAN-KRITICOS & GAVIN DILLINGHAM

**ABOVE** Svanemølle Combined Heat and Power Plant (CHP) in Nordhavn, Copenhagen, Denmark was built as a coal fired power plant between 1947 and 1953, but was converted into a natural gas fired CHP 1985.

Recently there has been increased interest in CHP as natural disasters — such as Hurricanes Harvey, Irma, and Maria — are demonstrating that beyond energy savings, CHP provides significant power resilience benefits. When the power grid goes down, these systems, if configured correctly, can keep the lights on.

## WHAT IS CHP?

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CHP is a type of distributed generation that provides concurrent power and thermal energy from a single source at the point of consumption (Figure 1). This single source is a prime mover, such as a reciprocating engine or turbine that drives a generator. The efficiency benefit comes from the ability to capture the waste heat to provide useful thermal services. Heat from the prime mover is recovered by a heat exchanger to

be used for cooling with an absorption or steam driven chiller, or thermal applications such as high-pressure steam, domestic hot water or sterilization. When determining whether CHP is a good fit for a facility, it is important to consider certain site and operational characteristics. For example, CHP is most economical when there is a constant thermal load and when there are higher power prices.

CHP is compatible with a variety of fuels, which can include biomass, biogas, landfill gas, etc. However, the greatest proportion of CHP applications utilize natural gas. Seventy percent of the 82.6 GW of installed CHP capacity is fueled by natural gas.

## CHP TRENDS

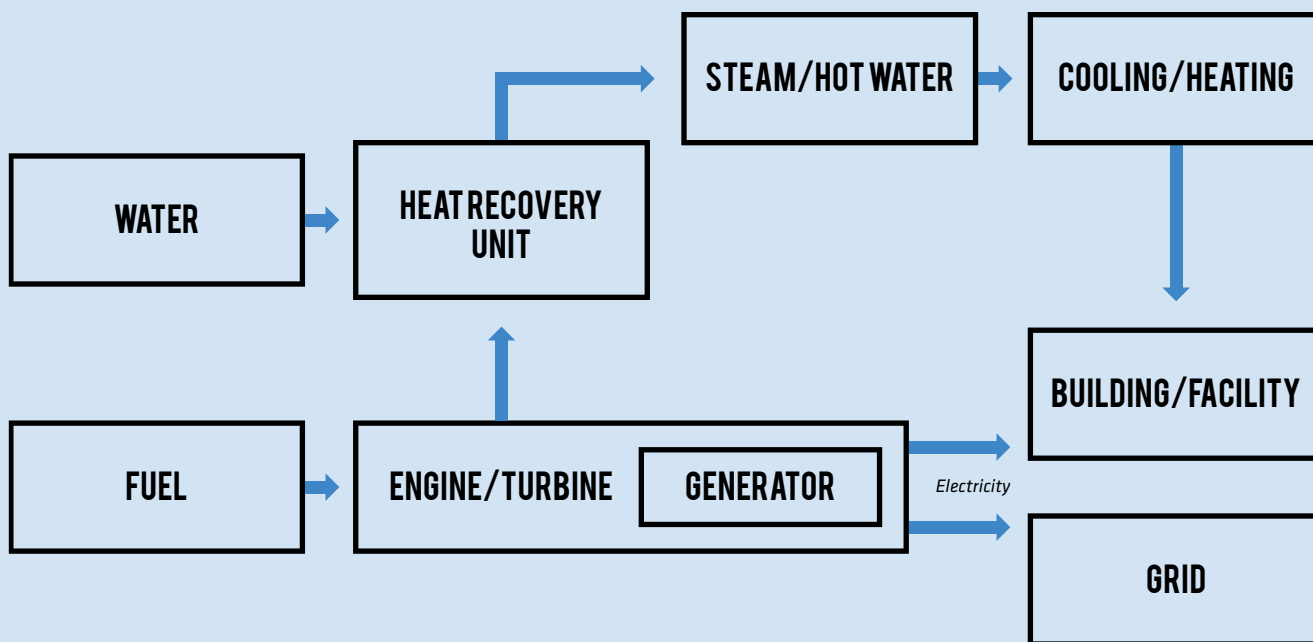
CHP continues to receive growing market and policy interest due to the increasing awareness of the benefits that the technology provides. Across the United States, this can be attributed to a growing number of state and local utility financial incentive programs, a federal investment tax credit and adoption of system interconnection standards across states. Beyond the financial incentives and standards, globally there is also a growing demand in the market for improved energy resilience as well as emission reductions. CHP has been shown to provide both of these benefits.

There has been a marked shift in the

number and size of CHP systems installed. For the first decade of the 21<sup>st</sup> century, CHP installations almost doubled (an average of 142 per year) in comparison to the 1990s (an average of 76 per year). Much of the growth of CHP installations can be found on the east and west coasts of the United States and may be attributed to the adoption of CHP and distributed energy incentive and grant programs.

Other reasons for the growth can be attributed to the increasing availability of smaller sized CHP systems, the known resilience benefits of CHP, the locational value provided by CHP systems and the manner in which CHP systems can integrate with and support the

FIGURE 1



**FOR THE FIRST DECADE OF THE 21ST CENTURY, CHP INSTALLATIONS ALMOST DOUBLED (AN AVERAGE OF 142 PER YEAR) IN COMPARISON TO THE 1990S (AN AVERAGE OF 76 PER YEAR).**

deployment of solar and wind sources.

With greater awareness of the benefits of CHP for smaller applications and the industry effort to develop packaged CHP systems, more end users are able to take advantage of CHP at their site. Figure 2 shows the top applications in terms of total installations in the last 17 years which include hospitals, colleges and universities, wastewater treatment plants, multi-family complexes, schools and nursing homes.

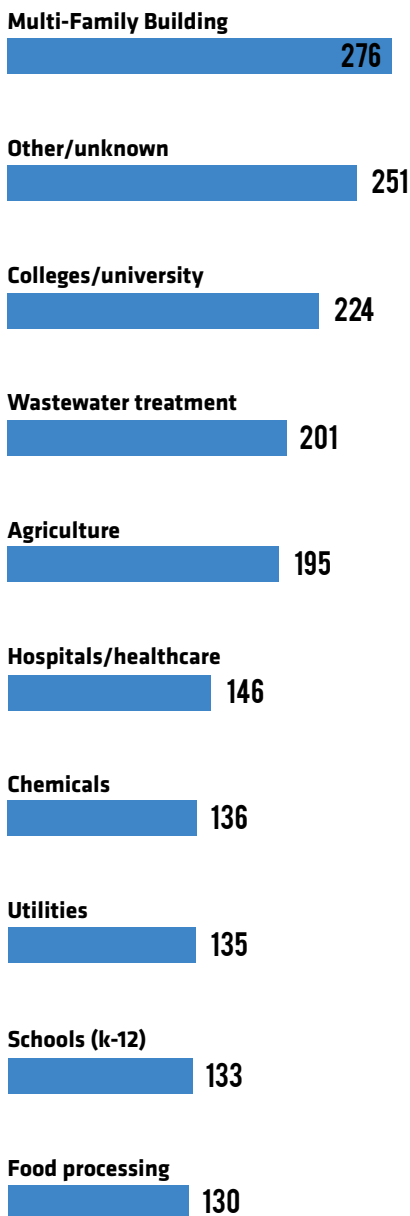
A greater number of smaller capacity CHP systems have been coming online in recent years. Starting around 2001 and 2002, the capacity of the systems installed decreased significantly. This shift to smaller sizes can be attributed to an increase in financial incentives that focus on smaller CHP systems, such as California's Self-Generation Incentive Program. This trend is also facilitated by availability of smaller CHP systems, the growing availability of packaged systems and development of interconnection standards for smaller CHP systems, typically less than 10 MW.

## RESILIENCE

As severe weather events grow in number and intensity, CHP is increasingly recognized as a technology to keep the power on during and after a storm. The reliability aspects of CHP was clearly shown in Superstorm Sandy in 2012. Superstorm Sandy resulted in wide-spread power outages costing more than US\$20 billion in losses due to suspended business activity. However, during the storm, CHP systems (with many in hospitals and universities) remained operational and kept patients and students safe during the storm.<sup>1</sup> In contrast, it was determined that many of the traditional back-up diesel generators either did not operate or did not operate for a long period of time. This can be attributed to the fact that some on-site generators are typically not tested on a regular basis and may have limited fuel supplies that must be replenished soon after a severe weather event. In contrast, most CHP systems operate on a 24/7 basis and continued to operate during the storm-related power outage event. Furthermore, most CHP systems

**FIGURE 2**

### TOP 10 APPLICATIONS BY INSTALLATION 2000-2016



Source: [energy.gov/chp-installs](http://energy.gov/chp-installs)

are fueled by natural gas and natural gas infrastructure is typically very resilient and sees minimal disruption during major natural disasters.

If designed appropriately, during a power outage event the system can disconnect from the grid and continue operations. This requires that the CHP system have black-start capability and have the

appropriate switchgear controls that allow it to operate in parallel with the grid. The cost of installing this equipment can vary considerably due to site conditions. However, by minimizing the likelihood of a costly power outage, including financial costs and health and safety risks, the up-front cost will likely be recovered during the first outage event.

Most recently, with Hurricanes Harvey, Irma, and Maria, we saw CHP providing significant resilience benefits. A prime example in Puerto Rico is the 2 MW CHP plant in Vega Baja. This plant operates at the Matosantos food processing facility. Although the entire Puerto Rico power grid went down, this site has been operating on propane gas without interruption since Hurricane Maria made landfall in 2017. The plant began operating in 2015 and the process of building an anaerobic digester to produce methane to fuel the facility is currently underway.

Another example of weathering the storm is the University of Texas Medical Branch (UTMB) in Galveston, Texas, USA. UTMB is a prime example of a CHP system that was built for resilience. After Hurricane Ike in 2008, UTMB was shuttered due to the significant damage from storm surge and wind. There was much discussion as to whether the hospital should reopen because of the risk of future storms. Due to the status of the hospital as a level one trauma center and the only trauma center on Galveston Island, the facility was rebuilt. To prepare for future storms, significant steps were taken to improve the resilience of this essential healthcare facility. A key component of this rebuild was the installation of two 7.5 MW CHP plants, located on opposite sides of the hospital campus. These systems are placed 18 feet above ground level to protect from future storm surge. The east CHP plant is currently operational and the second is undergoing commissioning. The investment has paid off. During Hurricane Harvey in 2017, the local utility lost two feeders into the hospital due to a flooded transformer vault. When the power went out, the CHP system continued to operate in island mode.<sup>2</sup>

A final example of investing in CHP for resilience and cost savings is the Michelangelo Hotel in New York City.

This 178-room historic hotel occupies seven floors in a 22-floor mixed-use historic building in the heart of Manhattan. In 2017, a 263kW CHP plant was installed to help keep the hotel online during future disasters, and brown and black-outs, as well as reduce the facility carbon footprint. Energy cost savings combined with funding from the New York State Energy Research and Development Agency (NYSERDA) demonstrated an attractive economic payback in addition to increased resilience.

## IFMA AND CHP

CHP has long been demonstrated as an efficient and economical technology across a variety of industry sectors. Recently CHP is becoming better recognized for its proven significant facility resilience benefits. The Department of Energy has been leading the effort to promote the adoption of CHP at critical infrastructure to improve facility resilience and reduce operating costs.

The most recent effort is U.S. DOE's Combined Heat and Power for Resiliency Accelerator.<sup>3</sup> The accelerator is working with utilities, communities, states, and a variety of other stakeholders to identify opportunities for greater deployment of CHP at critical infrastructure. In addition to the

resiliency accelerator, the U.S. DOE's CHP Deployment program has a set of CHP Technical Assistance Partnership (TAP) regions across the United States.<sup>4</sup> The CHP TAPs are available to work with end-users to determine if CHP is a good fit for their facility, as well as work with key stakeholders to inform them on opportunities for CHP across different industries.

The IFMA Environmental Stewardship, Utilities and Sustainability Community (ESUS) has partnered with the Department of Energy's Upper-West and Southcentral CHP TAP<sup>5</sup> to develop a technical assistance and engagement program for chapters located in those regions (Arkansas, Louisiana, Oklahoma, Texas, New Mexico, Colorado, Utah, Wyoming, Montana, North Dakota, and South Dakota) and the Academic Facilities Council, Data Center Facilities Community, Health Care Institute, Hospitality Council and Manufacturing, Industrial and Logistics Council.

This collaboration will deliver targeted content related to CHP and facility management that will help professionals stay current on industry trends and research. Stay tuned for upcoming articles, educational webinars and trainings that will help FM's understand the best practices in CHP technologies and applications in various market sectors and geographies. 

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2. [energy.gov/eere/amo/articles/chp-installation-keeps-hospital-running-during-hurricane-harvey?lipi=urn%3Ali%3Apage%3Ad\\_flagship3\\_company\\_admin%3BHAR%2FlujwRruf4TWemJ4gLA%3D%3D](http://energy.gov/eere/amo/articles/chp-installation-keeps-hospital-running-during-hurricane-harvey?lipi=urn%3Ali%3Apage%3Ad_flagship3_company_admin%3BHAR%2FlujwRruf4TWemJ4gLA%3D%3D)
3. [betterbuildingsinitiative.energy.gov/accelerators/combined-heat-and-power-resiliency](http://betterbuildingsinitiative.energy.gov/accelerators/combined-heat-and-power-resiliency)
4. [energy.gov/chp-CHPTAP](http://energy.gov/chp-CHPTAP)
5. The Southcentral and Upper West CHP TAPs are hosted by the Houston Advanced Research Center in The Woodlands, TX, USA



### **Marina Badoian-Kriticos**

*serves as Research Scientist for the Department of Energy's Combined Heat and Power Technical Assistance Partnership Upper-West and Southcentral regions at Houston Advanced Research Center (HARC).*



### **Gavin Dillingham, PhD**

*serves as Program Director of the Department of Energy's Combined Heat and Power Technical Assistance Partnership (DOE CHP TAP) Upper-West and Southcentral regions at Houston Advanced Research Center (HARC). This program is tasked with improving community resilience and reducing energy waste through increased investment in CHP.*

The Southcentral and Upper West CHP TAPs are pleased to partner with IFMA to enhance the capacity of its members to meet the challenges of sustainable facility management. If you are interested in assessing CHP for your facility or learning more please visit <http://esus.ifma.org/combined-heat-and-power/> or contact Dean Stanberry, ESUS Chair at [dean.stanberry@abraxasfm.com](mailto:dean.stanberry@abraxasfm.com) or Gavin Dillingham, PhD, U.S. DOE Upper-West and Southcentral CHP TAP Director at [gdillingham@harcresearch.org](mailto:gdillingham@harcresearch.org).



## Components in Focus

### IFMA ST. LOUIS FUNDS EFFORTS TO KEEP COOL THIS SUMMER

The St. Louis Chapter of the International Facility Management Association donated US\$1,000 to Cool Down St. Louis. The nonprofit organization builds awareness and provides resources to help those in need avoid heat-related illnesses and deaths, especially the elderly and disabled, and families with critically ill children.

Representing facility managers and suppliers who maintain the region's commercial buildings, the organization presented a check during IFMA St. Louis' celebration of National FM Day on June 6. Jennifer Johnston, IFMA St. Louis President, presented the check to Dennis Jenkerson, Fire Chief for the City of St. Louis and representative for Cool Down St. Louis.

IFMA St. Louis also funds the organization's Heat Up St. Louis, which provides services and support to keep residents warm during the region's winter months. IFMA St. Louis has supported the weather-related assistance programs during the winter and summer over the past five years. More than 300,000 area residents have received energy assistance since the programs' inception in 2000.

### IFMA Hong Kong Chapter Annual Dinner and Asia Pacific Facility Management Awards

The IFMA Hong Kong Chapter Annual Dinner and Asia Pacific Facility Management Awards 2018 was held on May 3 at Grand Hyatt Hong Kong. The Asia Pacific Facility Management Awards is the premier awards program for benchmarking excellence and recognizing outstanding achievements. To meet the growing needs of the profession, the Hong Kong Chapter extended the award categories to include Facility Management Strategy, Innovation, Technology, Sustainability and Occupational Health and Safety. To recognize distinguished professionals in the region and an individual's contribution to IFMA, the chapter introduced the Asia Pacific Facility Manager of the Year.

The event was officiated by HKSAR Government Director of Buildings, Dr. CHEUNG Tin Cheung, JP; HKSAR Government Director of Electrical and Mechanical Services, Ir Alfred SIT, JP; incoming IFMA Global Board chair, Graham Tier, and president-elect of Royal Institution of Chartered Surveyors, Chris Brooke.

Winners of the Asia Pacific Facility Management Awards were determined by a judging panel of past presidents of IFMA Hong Kong Chapter, IFMA Hong Kong Chapter Board of Directors, IFMA's Head of FM from The Hong Kong Polytechnic University and a representative from the Royal Institution of Chartered Surveyors (RICS), IFMA-RICS collaboration.

#### AWARD WINNERS

##### Asia Pacific Best Managed Sustainability Program Award

###### WINNER

Kai Shing Management Services Ltd., International Commerce Centre

###### CERTIFICATE OF MERIT

- Bayshore Development Group Limited, AIA Central
- The Bank of East Asia, Limited, Facility Management Department
- JLL, JLL Shanghai New Office
- Nan Fung Property Management, Nan Fung Commercial Centre
- Shun Tak Property Management Limited, Think Green • Live Green
- Urban Property Management Ltd., Ka Tin Court

##### Asia Pacific Best Facility Management Technology Award

###### WINNER

JLL, HSBC ePermit System

###### CERTIFICATE OF EXCELLENCE

AllianceBernstein Hong Kong Limited, Office of the Future

###### CERTIFICATE OF MERIT

- PureLiving Ltd., Eco-system of Indoor Air Control Technology
- AET Flexible Space (Hong Kong) Limited & Swire Properties Management Limited, Retrofit of Air Handling Unit
- En-trak Hong Kong Limited - Smart Lighting Project
- Shanghai Johnson & Johnson Co., Ltd., SJJ ETO Waste Water Further Concentration

##### Asia Pacific Best Occupational Health and Safety Award

###### WINNER

Hongkong Land (Property Management) Limited, Central Portfolio

###### CERTIFICATE OF EXCELLENCE

– Hong Kong District Cooling DHY Joint Venture, District Cooling System Phase 2 Works at Kai Tak Development

– JLL, CLP Power Station Integrated Facilities Management Services

###### CERTIFICATE OF MERIT

- Nan Fung Property Management, Comprehensive OSH Implementation Scheme
- CBRE, Contractor Safety Forum "Together for Safety"

*See additional categories and winners on the following page*

Continued from previous page: IFMA Asia Pacific Facility Management Awards Winners

#### AWARD WINNERS

##### Asia Pacific Best Innovative Project Award

###### WINNER

MGM MACAU, Monitoring Based Commissioning

##### Asia Pacific Best Facility Management Strategy Award

###### WINNER

AllianceBernstein Hong Kong Limited & M Moser Associates, Office of the Future

###### CERTIFICATE OF EXCELLENCE

- Arcadis Consultancy (Hong Kong) Limited, West Kowloon Cultural District
- JLL, Conghua Green Field

###### CERTIFICATE OF MERIT

- JLL, Ping An Insurance

##### Asia Pacific Facility Manager of the Year

###### WINNER

Samson LEE, AllianceBernstein HK Ltd.

###### CERTIFICATE OF EXCELLENCE

- Arnald NG, The Hong Kong Jockey Club
- LAI Chiu Cheong Frederick, The Bank of East Asia, Limited

###### CERTIFICATE OF MERIT

- Guy AINSWORTH-OAKES, Dussmann Service Hong Kong
- Jam CHEUNG, JLL
- LEUNG Chi Ping Pierre, Shun Tak Property Management Limited
- LAU Wing Sum Rachel, JLL

## ENGAGE CELEBRATES ONE YEAR

IFMA members have embraced the Engage platform in its first year. Available through the IFMA member website and through an app for smartphones and tablets, Engage has become a go-to place for FMs to share industry insight and advice. Since its creation there have been:

42,658  
total logins

3,793  
total posts

829  
new discussion  
threads created

11,930  
library downloads

**TOP 4 DISCUSSIONS ON ENGAGE:** Add, Move, and Change Policy // Sit/stand desks for everyone? // Space Heaters, Fragrances and Candles – Poking the FM Bear! // Sound Masking



### CODY CRAWFORD

Seattle member Cody Crawford, a senior manager of facilities and operations for Vulcan Inc., has worked in FM for two decades. The mix of engineering with business and operational management made it an ideal industry because it meant he would never be bored at work. He earned his BS in Facilities Management and Technology Studies from Colorado State University, Pueblo.

**CODY:** I was a collegiate wrestler. One of my teammates introduced me to FM.



### DR. DAVID OFORI

Based in Nanuet, New York, new member David Ofori is president of CMORS Group, LLC. He uses his previous academic experience and strategic planning and facility design skills to assist in making decisions for medical practices, surgical/urgent care facility construction and in recruiting professionals to manage these projects. He also serves as a consultant and advisory board member of several professional organizations.

**DAVID:** I vacationed in Toronto with some colleagues who convinced me to join them on a skiing trip. This was my first time and ... [after a slight bump] I tumbled downhill, screaming and grabbing any object in front of me [until I] found myself wedged under a pine tree completely buried under snow. I had a tow truck pick me up with a hook on my belt."



### DARCI BALDWIN

After earning two business-related degrees and an MBA, Colorado member Darci Baldwin became the facility manager for professional services firm, EKSGH. She oversaw the recent 150,000-square-foot buildout and 650-person move of the company's main office in the Denver Tech Center. She was drawn to facility management because I combined helping others and operational decision making.

**DARCI:** When not at work, I enjoy reading and spending time with my husband, son & pets.



### DENISE THOMAS

Minnesota member Denise Thomas has been in the FM industry for more than 25 years. As Smiths Medical Facilities Manager in Plymouth, she most enjoys the variety of work she's able to accomplish and the learning opportunities available in the field. Prior to Smiths Medical, she worked in corporate, academic and housing facilities.

**DENISE:** I tried to avoid moving to the metro from Mankato for my entire career, and yet, here I am. And surviving just fine.

## Components in Focus

# Occupier liability in the 21st Century Workplace

In the United Kingdom, the United States, Australia and other common law jurisdictions, occupiers owe a duty of care, through ownerships or leases, to people who visit their premises. This kind of occupier liability, which may arise from accidents caused by the defective or dangerous condition of the premises, is to a certain extent transferred to facility managers.

From 2018 onwards, since the enforcement of the Property Management Services Ordinance (PMSO) in Hong Kong, the licensed managers, companies and their contractors have to consider their possible additional legal burden: What happens if a wrongdoing is caused by the negligence of the contractor? Under what circumstances will the facility managers in Hong Kong, under PMSO, be liable when they act on behalf of their employers? What are the impacts of the legislation on visitors' safety and security? These questions serve as a useful reference when other common law jurisdictions consider introducing similar property management legislation.



Safety is a prominent concern to occupiers and visitors. In common law jurisdictions, occupiers of a property owe visitors a duty of care. This is a common law rule that has been replaced with or supplemented by legislations in many countries.

For example, in Australia between 1983 and 2002, occupiers' liability legislations were enacted in the four Australian jurisdictions.

In the U.S, premises liability law is well developed but differences are noted from state to state. The extent of landowners' duty of care to persons who come on their premises varies depending on whether the persons are classified as trespassers, licensees or invitees.

In Hong Kong, occupiers' liability is partly governed by common law and partly by the legislation, i.e. Occupiers Liability Ordinance (Cap. 314).

In the U.K., the Occupiers' Liability Act 1984 covers not only visitors but also trespassers. In the U.K., the Act extends the common duty of care to trespassers, providing that this duty is to be required when the occupier has actual or constructive knowledge that a danger exists and that a trespasser is or may be near it. It allows an injured trespasser to claim for death and personal injury, not for damage to personal property.

The usual question about the occupiers' liability is who the occupiers are. The deciding factor is whether the person has sufficient control over the premises. For example, a facility manager is usually regarded as an occupier of the building he or she looks after due to his or her control over the management of the building.

### **The FM liability**

Since the 9-11 attack on the World Trade Center in New York City in 2001, there has been a growing awareness of security throughout the world. Workplaces have been identified as potential terrorists' targets. Acts of terrorism on facilities include bomb scares and bombings; cyber-attacks (computer-based); and the use of chemical, biological, nuclear and radiological weapons. High-risk facility targets cover military and civilian government facilities, international airports and landmarks.

In the IFMA Learning System for CFM, there is clear guidance about emergency preparedness, ranging from managing risk to developing, testing and evaluating emergency plans. However, facility managers should note the differences between terrorism and other risks. Attention to the following, as noted by Chris Phillips of International Protect and Prepare Security Office, is necessary when facing terrorism:

When evacuation is the usual response of emergencies, a terrorist emergency may require facility managers to be resilient. Sending people outside could be dangerous while staying within a building envelope may be safer.

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Facility managers need to plan and decide the safe places within premises, lead the visitors hiding from attackers and create a barricade.

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Staying away from windows which can cause numerous injuries in the event of an explosion.

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Facility managers should practice and revise such plans as frequently as a fire drill.

Many governments' security departments issue guidelines regarding security to the general public and facility occupants. For example, on the website of the Australian National Security, advice is given about reporting suspicious behavior and what to do in an emergency.<sup>1</sup> Obviously, visitors rarely pay attention to such advice in their ordinary lives. Owners and facility managers should take the leading role in safeguarding their visitors' exposure to terrorist attacks.

A competent facility manager should not assume that following the guidance from government or consultants would be adequate for tackling terrorist threats because exogenous factors may cause the threats to be higher at a particular time and venue, e.g. a visit of a presidential candidate to a university. Therefore, facility managers should tailor-make a contingency plan for each event.

It is commonly accepted that facility managers should be the professionals responsible for visitors' safety and security because this is part of the job duties of facility managers. For some buildings or premises, there could be more than one occupier (see *Wheat v Lacon* [1966] AC 552). In such cases, occupiers other than facility managers (e.g. an owner-occupier who is the employer of a facility manager) are responsible for visitors' safety and security, too. In short, facility managers and relevant occupiers share the occupiers' liability, with the occupiers also bearing the employers' liability. However, this apportionment of liability may be changed in Hong Kong after the implementation of the Property Management Services Ordinance (PMSO).

### **Impacts of the PMSO in Hong Kong**

The recently enacted PMSO is legislation that governs the property management profession in Hong Kong. According to the legislation, the scope of control covers facility managers and related professionals who deliver any of the following seven categories of property management services: General management services relating to a property; Management of the environment of a property; Repair, maintenance and improvement of a property; Finance

# The objective of the PMSO is to improve the property management services in Hong Kong through overseeing the property and facility managers and services companies.

and asset management relating to a property; Facility management relating to a property; Human resources management relating to personnel involved in the management of a property; Legal services relating to the management of a property.

Literally, the terms “safety” and “security” are not specified in any one of the above categories. Nevertheless, general management services relating to a property and management of the environment of a property generally embrace safety and security services. Many safety and security devices in a building require repair and maintenance.

Under the PMSO, a Property Management Services Authority (PMSA) is set up. It will regulate the property management companies (PMCs) and property management practitioners (PMPs) in Hong Kong through the implementation of a licensing system, issue of codes of practice and the standards for property management services, dispute resolution and complaint investigation on breach of the ordinance. The source of finance for the PMSA is collection of levy through conveyance on sale and stamp duty.

The objective of the PMSO is to improve the property management services in Hong Kong through overseeing the property and facility managers and services companies. It is foreseeable that the PMSA will enhance the safety and security services in facilities by taking better control or providing more guidance on the works of property managers and companies. Such guidance may cover the service contractors of non-conventional property management services, e.g. safety planning and

security devices maintenance. Facility managers who manage service contractors may be liable if a wrongdoing is caused by the negligence of their contractors, especially if it is so specified by the PMSA in the coming codes of practices under the PMSO.

In Hong Kong, there have been discussions about the difference between facility manager and property manager, but the distinction between the roles of the two is often blurred. It is possible that PMSA may define the difference if it is going to oversee property managers but not facility managers. Alternatively, one may dodge the question by saying the definition of property manager (or facility manager) will be determined based on individual cases. Expectedly, the facility management service employers will act more wisely and faster by clearly defining the services they need in their service contracts. For example, facility management services in the future may specify the circumstances in which the facility managers will be liable when they act on behalf of their employers. In so doing, the visitors' safety and security will be improved as the requirements of the property and facility management service contracts are likely to go up.

Another issue is about occupiers' duty of care to visitors. Will the PMSO have an impact on it? With the PMSO in force, the appointment of a licensed PMC or PMP discharges an owner's duty of care for the area being managed. Since the PMSO does not change the occupiers' legal position and by virtue of the Occupiers Liability Ordinance (Cap. 314), it is not likely that the owner would be liable for the wrongdoing of

his or her contractor if in all the circumstances the owner has acted reasonably in entrusting the work to his or her facility managers. **FMJ**

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**Dr. Philip Wong** is a traffic engineering and FM consultant. He completed his PhD in Facility management at The Hong Kong Polytechnic University where he gives lectures on FM as a guest lecturer. Philip earned his LLB (Hons) degree through part-time study and developed his research interest in laws related to FM. He has served on the board of IFMA Hong Kong Chapter since 2012. Philip is an IFMA scholarship winner.



**Dr. Joseph Lai** is an associate professor in the Department of Building Services Engineering, The Hong Kong Polytechnic University (PolyU). With a first-class honours degree in building services engineering, a master's degree in environmental management and a PhD in facilities management, Dr. Lai is the PolyU Facility Management Programme Leader specialized in teaching management for existing buildings and legal matters in facility management. With his research focused on facilities engineering and management, Dr. Lai has published widely in international journals. Serving as co-editor of the journal “Facilities” and a regional editor of the journal “Smart and Sustainable Built Environment,” Dr. Lai is also on the committees of various professional institutions and public bodies.



BY RICHARD ALEXANDER

Ever heard the phrase: *If you can't measure it — you can't improve it?* That's true for many aspects of facility management. However, customer satisfaction is so subjective and emotive that the FM practitioner is encouraged to take a three-dimensional approach to the process of measuring occupant satisfaction.

A good starting point is to determine what satisfaction means to a customer. A contractual-minded person may consider compliance as a critical indicator, whereas an operational-minded person may focus on achieving key performance indicators. A commercial-minded person may be overly concerned with scope and achieving profit and other financial targets.



These are all important indicators of satisfaction, however, as most FM practitioners will have experienced, achieving targets is one thing but keeping the customer satisfied is quite another. It is perfectly feasible to be operating a building in compliance with all health, safety and environmental legislation and to respond to customer requests within pre-agreed response times, yet the customer is still not satisfied. So, why is this?

The reality is it could be a lot of things. But one of the single biggest contributors to poor customer satisfaction is poor communication. Effective communication bridges the gap between aspects of facility management service that can be measured and aspects that can't. Effective communication takes care of the emotive needs of customers and determines the lasting experience that a customer may have of FM.

Technology has a part to play in improving the methods and speed of communication, but does it leave the customer satisfied with the experience? How many times does one pull their hair out listening to recorded telephone systems, or resorted to telephoning the call center because ordering on-line has stopped working? And then worse-case scenario — the customer service agent puts you hold because their screen has frozen!

One can go on and on, but the message is clear: As the speed of technology increases, and the FM industry plays catch up, FM leaders must pause, reflect on the purpose of FM, and ask, who is the industry trying to satisfy?

Before rushing out to procure the latest gadget or software upgrade, consider this: Are the basic building blocks in place for FM practitioners to communicate effectively to customers?

Employees must have the back-office

support infrastructure to enable them to work in a customer-focused manner. Employees must be given the right tools to do the job, the appropriate personal protective equipment to keep themselves and customers safe, and they must have available critical spare parts and materials to fix problems with minimal disruption to the customers' business activities.

The company must not let down those employees who are responsible for managing customer requests and complaints. Of course, FM companies rely on the client's payment of invoices and for their supply chain to be reliable, but they should not be the root cause of any delay nor directly contribute to customer dissatisfaction.

Investing in people and resources while remaining honest and exercising integrity instills confidence in employees. Further, these enable the employee to speak free-

ly and honestly to customers about what they can and can't do to provide a solution to their problem. If the company's back-office support infrastructure and associated processes and procedures work, and the customer is placed first, then the employee should be empowered to explain to customers the steps in the process to resolve their issue.

## TRAINING THE TEAM

Knowledge enhancement and sharing is crucial to create informed employees. With knowledge comes confidence and the ability to communicate solutions to customers with credibility and clarity.

Training employees is critical, and so is empowerment. Industry leaders should avoid stifling an employee's ingenuity and ability to satisfy the customer by enforcing unnecessarily rigid processes and procedures. Free up the employee to make decisions, create innovative solutions, and support them during good and bad times through a process of mentoring and support. This improves employee motivation, the benefits of which are often realized in the execution of quality customer service. Management studies support this claim and have found the benefits of increasing employee involvement in decision-making includes lower job strain and dissatisfaction, greater efficiency and commitment, reduced costs, knowledge generation and connectivity in an organization.

Take a step back further and explore the recruitment process. How do company values play a part in this process? Arguably, the collective personal values of 3,000 staff members is better than five or six corporate values imposed on 3,000 people. The company should capitalize on individual values and invest in the development of those values over the long-term.

Managers should reward staff appropriately in recognition for their hard work and take an on-going interest in their career growth and general well-being. Managers also have a critical role in setting internal communication strategy to facilitate staff productivity. To this point, research by the Institute of Directors in the U.K. found that 65 percent of managers reported increases in produc-

tivity after the introduction of a communication program, while 80 percent reported improvement in morale and organizational loyalty, 46 percent reported reduced employee turnover, 41 percent reported decreases in absenteeism and 68 percent reported fewer industrial disputes. Only 3 percent of the 115 managers interviewed thought introduction of a communication program was ineffective in bringing about improvements.

Recruiting the right people, training and investing in people and then rewarding people for their achievements is the basis of a satisfied workforce. A satisfied workforce is a productive workforce, and it is the responsibility of leaders and managers to channel that productivity effectively, partly, in the form of effective communication with customers.

## CLOSING COMMUNICATION LOOPS

So, what does effective communication look like? FMs must switch off the surrounding noise and listen to the customer. Understanding the customers' needs and exuding empathy is the crucial first step to customer reassurance and identifying an appropriate solution. Even if the solution is not immediately

obvious, work in collaboration with the customer to identify a solution. This means keeping the customer informed every step until a solution is provided. Customers are usually very forgiving and reciprocate with equal empathy if they can see action being taken and the FM practitioner is doing their best.

The method of communication can exacerbate an already hostile situation. Where possible, avoid email, telephone and texting. Rather, physically interface with customers. When this is done in a personable and friendly way, this approach can greatly enhance the building of a constructive relationship going forward and the customer is more likely to be amenable in the future.

Physical interface with the customer highlights the importance of physical presentation and appearance. Some interviewers say the first thing they look at when conducting an interview is the interviewee's shoes. The notion being a well-polished pair of shoes speaks volumes about one's attention to detail and portraying the right perception, image and reputation to others. This notion must continue throughout employment, particularly when interfacing with customers. Employees must be well groomed and carry themselves in a professional manner. Always look ready and willing to help and avoid unfriendly and unhelpful body language. It's amazing how a subtle roll of the eyes is not very subtle from the customer's perspective and can cast long-term aspersions on the broader reputation of the organization. Indeed, research indicates how little actual words are received in the communication process compared to body language, facial expressions and vocal characteristics.

Of course, there will always be those occasions where, despite every effort made to satisfy the customer, simply nothing will do! This is when management needs to step up and support staff accordingly. Assuming the employee has done everything in their power to resolve the customer's issue or complaint, it is vital that the employee is not left feeling despondent. Negativity must not be allowed to fester and spiral out of control. Providing the necessary management support to re-energize

### RECIPIENT'S ACKNOWLEDGMENT OF MESSAGE BY PERCENT



7% Words

18% Vocal characteristics (tone, volume, etc.)

75% Body language



and motivate the employee will lift their spirit and help them manage the next customer request or complaint.

Managing communication changes

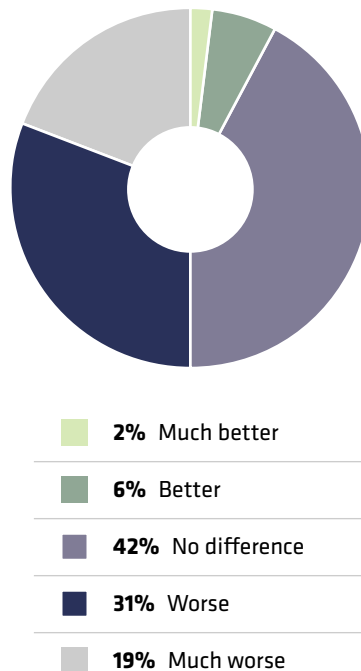
Those in strategic leadership roles have a significant role to play in customer communication and satisfaction that goes beyond supporting their staff. Communication may be an inherent problem within an organization and may need to be improved as part of a broader cultural and strategic change initiative. Leaders and managers must be responsible for setting strategic direction and leading by example.

A good testing ground for effective communication is the process of change. Occupants naturally become attached to their workspace and their immediate surrounding environment, and they develop their own style of working that is both conducive to them and the business. Any disruption to this arrangement fills the occupant with dread. The emotive and sensitive nature of workplace change demands investment in, and execution of, effective communication.

Melanie Bull and Tim Brown at Sheffield Hallam University undertook a study examining communication effectiveness during the implementation process of an alternative workplace strategy (AWS) at a blue chip organization. The premise for the move is aligned with previous research that suggests AWS can save an organization 30 percent of its office costs. However, the occupant satisfaction levels following the change were strikingly poor with a 50 percent dissatisfaction rate while only eight percent felt noticeably more satisfied.

The research concluded the main reason for such dissatisfaction was poor communication and absence of a formal communication strategy at the heart of the change initiative. A lack of occupant participation and consultation, and the mediums and timeliness by which information was communicated, was cause for much disgruntlement. Moreover, the people responsible for communicating to occupants about progress were not necessarily best placed to do so and adopted a dictatorial approach. This impacted negatively on the way information was received by occupants and led

## OCCUPANT SATISFACTION LEVELS FOLLOWING AWS CHANGE



to information being distorted.

In separate research by Lisa Campbell and Edward Finch at the School of Construction Management and Engineering, University of Reading, suggests communication approaches that may have resulted in greater satisfaction among occupants. The research indicated two-way communication is most effective. A service approach, as opposed to a technical approach, was favorable. Interactional treatment is critical — listening to customer needs, empathizing, and treating customers fairly and courteously.

Adopting this approach may not guarantee the success of a workplace change initiative, but it would appease any anxieties and negativity among occupants directly affected by the workplace change. Occupants therefore may be more accepting of change. Moreover, research indicates a direct correlation between open communication and employee satisfaction and positive outcomes.

Customer satisfaction is the reason the FM industry exists, and the way FM practitioners communicate with customers plays a large part in achieving an acceptable level of satisfaction. The

AWS for this blue-chip organization is a case in point and reaffirms the criticality of effective communication to achieve customer satisfaction.

It is a paradox that the technology developed to support effective communication and contribute to customer satisfaction has also caused industry leaders to lose sight of the building blocks needed for FM practitioners to communicate effectively with customers. While technology has its place, leaders are encouraged to get back to basics to ensure they have the right back-office support networks, availability of resources, ensure they are recruiting and investing in the right people and empowering and motivating the workforce with effective leadership and management. Collectively, these fundamental blocks provide the foundation for a happy and productive workforce that is much more inclined to satisfy the needs of customers. **FMJ**

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Richard is originally from Harrow, England, is 41 years old and married with two children. Richard moved to the Gulf in 2009 and has served the FM consultancy industry for most of that time. Richard was also operations manager for two years at Ecovert Qatar between 2011 and 2013. Prior to moving to the Gulf in 2009, Richard worked for WSP Group and Turner & Townsend. Richard is a post graduate of The College of Estate Management, England and is now in his final year of an MBA in facilities management at Sheffield Hallam University, England.

# Improving FM with Lidar

BY FRED WOODS

Whether a capital improvement project (CIP) is planned to retrofit an installation, retool a facility or design a campus, FMs need to know where sensor control systems and assets are or will be located. This involves more than looking at a blueprint or building information modeling (BIM). There must be an accurate and precise basemap and 3D model. This is especially important for existing facilities. These facilities often encompass multiple buildings and have adjacent components, such as parking garages, common areas, sidewalks and more. The annual facility assessment helps the team understand what the organization has, but it may not map the location, position and viewshed of sensors and other items that make up the facility's Internet of Things (IoT) infrastructure.

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**TOP RIGHT** Construction monitoring through the use of terrestrial LiDAR scanning, in 3D, to get everyone on the same map.

**BOTTOM RIGHT** Design built inspection, as shown through reflectance view of LiDAR data makes features stand out.

*Images courtesy of Riegl USA*



## What makes a facility smart and safe?

Modern control systems and IoT implementation makes a facility intelligent and the types of sensors, controls and analytics used can help make a facility safe. Supervisory control and data acquisition (SCADA) systems and IoT optimize efficiency, reduce operational and maintenance costs and maximize sustainability. IoT is pervasive, and when coupled with geospatial technology, it helps bring multi-faceted facilities into one view. Today's facility managers embrace the technology that helps them provide comfortable, energy efficient and safer facilities, and these safe facilities are built on smart facilities. Smart facilities provide the backbone for planning and adding IoT infrastructure specifically for safety measures.

Creating a smart and safe facility does come with some challenges. During the construction of the facility, design and function may conflict, which causes the repositioning of IoT gadgets and infrastructure. In older facilities, vegetation and unrecorded improvements may cause sensor clash, therefore changing or reducing the effectiveness of systems and sensors. Additionally, an inventory of assets is man-hour intensive and may not map the specific location, position and viewshed of IoT and control system assets. Further complications include geographically dispersed facilities, such as with a campus, military or law enforcement installation, or an entire city. They can be spread out even further regionally, countrywide or across the globe.

Using IoT in a facility is more than just looking at readouts, numbers and limits on a screen. A geographic view, also known as a map view, of the facility will help FMs see patterns that are not apparent when looking at spreadsheets, graphs or key performance gages. The vital technology is geospatial technology, such as a geographic information system (GIS) as the integrative technology that brings a SCADA system, IoT and other back office systems together.

Mapping a facility requires geospatial information to create an essential, precise and accurate basemap. Lidar and photogrammetrically derived point

clouds offer a rapid solution to many aspects of creating a basemap. The benefits of using lidar indoors include a precise and accurate 2D basemap or floorplan of the indoor environment and a survey-grade 3D lidar-based or photogrammetric point cloud model of the facility. Outdoor lidar includes terrestrial and airborne lidar collection, mobile mapping systems and photogrammetric point clouds. Collecting data outdoors is challenging due to vegetation and terrain, but can yield similar products such as a basemap and surface model.

Many invaluable products are derived from point clouds, including basemaps, topographic maps, 3D models, surface models, elevation models, vegetation models, models of interior and exterior spaces and as-built models. Secondary products include asset inventories, viewshed analysis and sensor clash-detection assessment.

For the FM, geographically referenced point clouds should be a staple tool. Lidar provides decision products quickly with minimal disruption to facilities and occupants. The cost of collection is mitigated by the reduction in man hours to collect similar information and the reduced time from contract to product delivery.

## What's the catch?

How does an FM store, manage, visualize and share the volumes of lidar and products derived from point clouds?

Ben Judge, CEO of Sightline Maps, summarized it best by saying, "Lidar and point cloud data can be used by facility managers, civil engineers and emergency managers to bring part of the physical world to life. This reduces [decision] time and makes their jobs easier."

Lidar and photogrammetric point clouds are becoming an integral part of infrastructure projects. According to Los Angeles County Geographic Information Officer Steven Steinberg, "Future capital improvement projects to build facilities will include deliverables such as BIM, computer-aided design (CAD) and other inside infrastructure spatial data to integrate with GIS."

FMs have many things to consider when dealing with this data. Point clouds must be shared with other facil-

FMs should consider the following when using lidar and photogrammetric derived point cloud data:

- Storage space required can be petabytes or more
- Access to data must be 24/7
- Stakeholders and contractors must be able to visualize the data in 3D and share it with others
- The budget must account for technology and people

ity stakeholders, including engineering, IT, management staff and outside contractors. Lidar and point clouds bring the facility to life through 3D models and are invaluable when collaborating on a project.

GISs are used to store geospatial data such as vector point, line and polygon data with attributes and imagery such as satellite and aerial photography. Vector spatial data types have traditionally been stored in a relational database management system (RDBMS). Imagery and lidar were stored as files. There are compression capabilities for imagery and lidar, but they can be "lossy," meaning they lead to degradation of the compressed data. Modern systems include this approach as well as cloud, SQL and Hadoop for big data and hybrid systems with a mixture of technology to handle spatial data.

According to RIEGL USA Mobile Systems Segment Manager Joshua France, "The biggest challenge is finding a way to index and catalog the data along with the associated metadata so that it can have a second or third use after its initial collection purpose is finished."

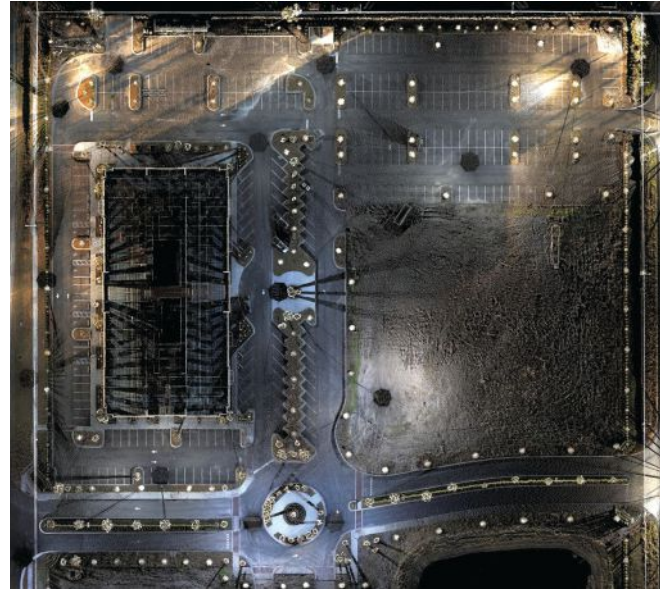
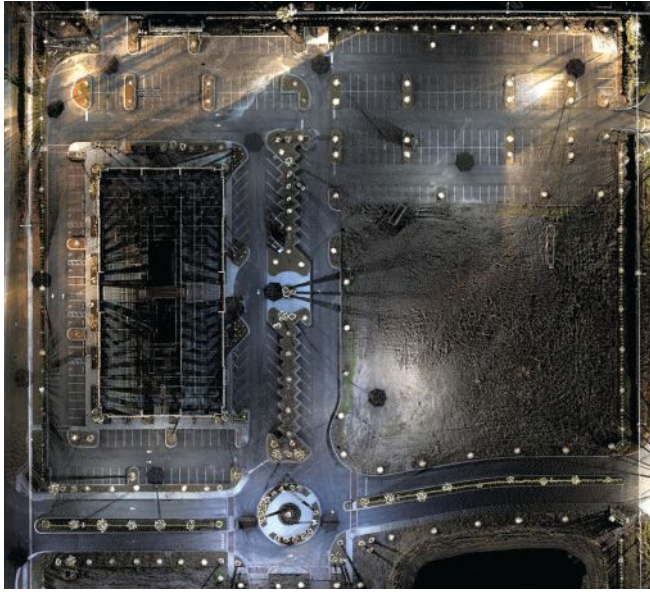
The volume of the data is dauntingly large depending on density, area of coverage, revisit rate and historical coverage. Data volume may challenge local storage solutions and the reasonable step is to store the data in the cloud.

FMs in both the commercial and government sectors have their challenges.

"Everything boils down to availability. Making lidar data available ensures that the maximum number of stake-

**LEFT** Aerial view of lidar aids with streetlight and vegetation inventory.

**RIGHT** Multiple products are derived from lidar, such as this drainage survey. Images courtesy of Riegl USA



holders can leverage their resources towards a common end: the ability to collaborate easily to make better decisions,” Judge says.

Having data available for visualization, anytime on any device, is a necessity.

“Data is infrastructure,” Steinberg says. “Making public data available adds infrastructure to the community.”

Having an easy way to share lidar and point cloud data makes for good business in the private and public sector. According to Steinberg, “Nothing is gained by hiding it.”

Having data available promotes innovation within the public and private sector. FMs and stakeholders need to consider costs when working with geospatial data, especially with lidar and point clouds. What solution is right for a particular facility? FMs need access to skilled technicians and application experts, either on staff or under contract. Forward thinking FMs know skilled IT professionals are required for dealing with the disparate technologies and voluminous data used and produced by facilities. Many technologists are comfortable with handing the data in-house on servers and creating portals for easy access and sharing. Over the last decade, however, cloud infrastructure has gained enormous popularity as the favored place to backup and store

mission-critical information, as well as regulatory information, for facilities.

Lidar and photogrammetric point cloud data have grown to immense proportions. Airborne lidar collections increased in density from less than one point per square meter to hundreds of points per meter in some scenarios. Drone, mobile and static lidar can and will produce a nominal point density of greater than 16 points per square meter. When intensity values, multiple returns and other attribute information are included, these data sets can be huge, requiring petabyte to exabyte storage solutions.

Planning and budgeting are critical for FMs, and proactive maintenance and management of IT infrastructure is a necessary business function. This includes gathering future software, hardware, training and personnel requirements. Awareness of the immense size of lidar databases should help guide FMs to a subscription cloud service for lidar data.

## What does all this mean?

Photogrammetric point clouds and lidar are a great resource. They can be used to create smarter and safer facilities. From IoT placement to deconflicting sensors and documenting as-built infrastructure, this data is invaluable for FMs,

Factors to consider when reviewing cloud services for lidar include:

- Easy file management
- No ties to proprietary licenses
- No add-ins, plug-ins or software to download
- Mobile sharing

stakeholders and contractors. Lidar reduces time from data capture to product generation, whether in-house or contracted, for use in the decision-making process. When an FM needs accuracy, precision and location, they need lidar. **FMJ**



**Fred Woods** is vice president of marketing at GeoNeo, Inc., a veteran-owned geospatial

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