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VOL. 30 NO. 01

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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 more than 100 countries. This diverse membership participates in focused component groups equipped to address their unique situations by region (136 chapters), industry (16 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. For more information, visit www.ifma.org.

FMJ FMJ (ISSN 1059-3667) is published six times a year (January/February, March/April, May/June, July/August, September/October, November/December) by the International Facility Management Association, 800 Gessner Road, Suite 900, Houston, Texas 77024-4257 USA. Periodicals postage paid at Houston, Texas and at additional mailing offices. One electronic copy of each issue is supplied to IFMA members. Printed copies are available to members at an additional US$48 per year. Nonmembers can purchase a subscription for US$84 per year. To receive a subscription, mail a check to FMJ, attn: Subscriptions; 800 Gessner Road, Ste. 900; Houston, Texas 77024-4257 USA or visit www.ifma.org/fmj/subscribe. For advertising rates call +1-281-974-5674 or email diana.maldonado@ifma.org. FMJ is printed in the United States. FMJ reserves the right to edit any articles received or solicited for publication. This right includes the discretion to select titles, artwork and layout. Opinions expressed in articles are those of the authors, not necessarily those of FMJ staff.

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FMJ Extended

Check out the online issue of FMJ for a special section that follows the end of the print magazine and includes additional articles not available in the print edition. Read the extra articles listed below for contributions from councils and communities, and other supplementary content.

Correction:
In the World Workplace 2019 feature in the November/December edition, the names of the winning IgniteFM! Student Competition teammates were omitted, as the FMJ went to print as World Workplace was concluding. Our apologies and our congratulations to the winning IgniteFM! Green Team of Mohammad Aldaaja, Cailyn Poschner, Victoria Smikowski and Yujin Kim, whose solution to an FM-specific scenario earned them a prize of US$1,000 to be split among the students.

IN CASE YOU MISSED IT ...

The November/December 2019 issue of FMJ focused on budgeting for FM priorities. The most-read article was Budgeting 101 by Bill Conley. Learn more about the basics of FM budgeting by visiting http://bit.ly/2EDxpv2

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IFMA's FMJ

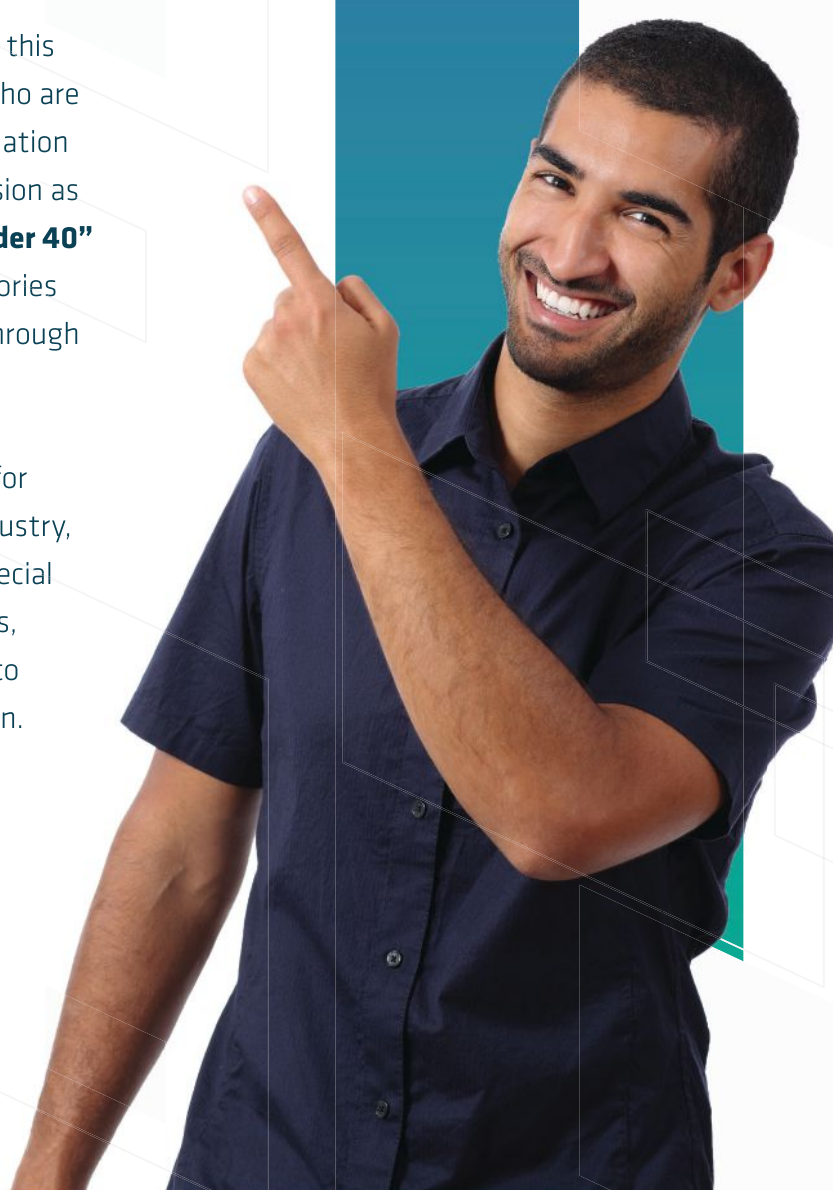
Do You Know A Young FM That is Making a Positive Impact?

Nominate Them as One of IFMA's Forty Under 40.

As part of IFMA's 40th anniversary celebration this year, we are looking for young professionals who are influencing both the profession and the association as remarkably and with the same level of passion as IFMA's founders. IFMA's upcoming **"Forty Under 40"** initiative will collect, applaud and share the stories of FMs under 40 who are making an impact through initiative and ingenuity.

Nominations are being accepted at IFMA.org for those making a positive impact on the FM industry, whether through innovation and discovery, special achievements, overcoming extreme challenges, making notable contributions, rendering aide to others or bringing recognition to the profession.

Learn more at
www.ifma.org/40underforty



Editor's Note Bobby Vasquez

Technology for the built environment is advancing at never-before-experienced speeds. Acquiring, storing, analyzing and protecting coveted data is as easy as a push of a button or a swipe on a smart device.

Our buildings' inner workings are communicating with each other like never before, capturing those conversations into snippets that give FMs the data they need to make their next decision.

But managing that data, how it's stored and protected, what it means and how to apply it can be more difficult than keeping pace with the emerging technologies that collect it.

"The cutting edge" is a sexy technology term; but sometimes we must ask ourselves if grabbing the next shiny object is really that important.

This edition of IFMA's FMJ explores smart trends and strategies for intelligent buildings, including technology and data involving indoor vehicles (page 18), smart office design (page 36) and digital ecosystems (page 68).

Being on the cutting edge can be expensive and overwhelming. However, the makeover of your facility does not have to happen in one fell swoop. It is okay to upgrade a little at a time. Right-sizing the installation, activating the technology to meet your specific needs and training users is oftentimes more important than rushing into the latest tech innovation.

But if that shiny object can fill an urgent need, then decision makers must be presented with a clear plan of what is in place and how the FM wish list is necessary. Arming yourself with as much information as possible and concisely presenting it can mean the difference between a smart cutting-edge portfolio and lagging behind in crucial data acquisition and protection. Retaining complex building and systems knowledge from retiring FM personnel, for example, is critical to the future of your facility – how can you move forward without knowing what's been done (page 24)?

However you proceed – whether incrementally or all at once – non-action is the most dangerous action. Data as a currency has a wide range of suitors, many of whom are willing to acquire and use it for nefarious means.

Research, then assess what's best for what you manage. In addition to the FMJ, IFMA's Engage platform (engage.ifma.org) and the Knowledge Library (ifma.org/know-base) are two valuable resources for practical answers. Ask fellow FMs about their experiences. Data is attainable simply through networking.

The right answers for what is best for your facility are out there and in this "FM Technology Round-up" edition of your FMJ.

Cheers!

Interested in writing for FMJ?
Email **bobby.vasquez@ifma.org** article ideas to be considered for future issues of FMJ.

From the **Chair**

JOHN CARRILLO

CFM, IFMA FELLOW

Chair, Board of Directors

It is critical in today's environment to continually update your company's Disaster Recovery Plan (DRP).

One of the obvious reasons to update your plans on a regular basis is due to continual personnel changes in your business.

It also provides an opportunity to remember lessons from previous disastrous situations whether large or small. Many times, an issue like a sprinkler malfunction can be a huge impact to your business, especially if your response time to address the emergency was slow. It is equally important that your supply chain restoration vendors and/or subcontractors are priority first in response to your company when larger disasters affect the greater community.

More catastrophes may be the new normal based on global warming and climate change. We have experienced significant hurricanes within a short period of a couple of years – Harvey, Irma and Maria. There have been increasing high winds and fires in the western United States where many lives were lost, whole communities destroyed and a significant impact to family life and businesses was made. Many of these fires were caused by unreliable electrical transmission grids that run from state to state.

This issue will take many years to resolve, but in the meantime, businesses and homes are operating from emergency generator backup units. Rising sea levels will be a significant issue to deal with near the oceans' coastlines.

According to Brock Long, FEMA administrator, "Resiliency is more than just strengthening our buildings and other infrastructure, it's making sure that our citizens have the proper tools and skill sets to reduce the impact of future disasters."

When disaster strikes, minimize disruption to your business, customers and business continuity plan. Consider putting your business continuity plan on cloud computing backup infrastructure to ensure a quick and efficient recovery, which can be more cost effective. Disaster recovery solutions are relatively easy to set up in the cloud, especially compared to setting up your own duplicate data center. Avoid the cost to purchase and deploy backup servers, drives and disks. Cloud services can be easily scaled up to meet demand as needed.

Preparation is a key component to recovery. Identifying weaknesses and fortifying plans and procedures can mean the difference between survival and failure.

IFMA WELCOMES THREE NEW CHAPTERS

During their October meeting at World Workplace 2019, IFMA's global board of directors approved the formation of three new chapters: IFMA Kazakhstan, IFMA Mexico City and IFMA Suzhou.

IFMA Kazakhstan Chapter
International Facility Management Association

IFMA Mexico Chapter
International Facility Management Association

IFMA Suzhou Chapter
International Facility Management Association

As the facility management industry broadens its reach globally, IFMA continues to grow its professional community and raise the profile of FM around the world. A local source of education, information and interaction, IFMA chapters narrow the vast FM world to local interests, issues and opportunities. The growth of IFMA's network of chapters helps ensure that built environment professionals have direct access to career support, resources and industry information.

IFMA's "Forty Under 40" campaign focuses on the future

As part of this year's 40th anniversary celebration, IFMA is not only looking back on achievements in advancing the professional discipline of facility management worldwide, but also looking forward to a brilliant future. Whose talent and vision will drive our progress over the next four decades?

Today's generation of FM professionals are influencing both the industry and the association as remarkably and with the same level of passion as IFMA's founders. IFMA's recently launched "Forty Under 40" campaign will collect, applaud and share the stories of FMs under 40 who are making their mark through initiative and ingenuity.

Nominations are being accepted for young professionals positively impacting the FM industry, whether through innovation and discovery, special achievements, overcoming extreme challenges, making notable contributions, rendering aide to others, being a model representative of the industry through charitable works or bringing recognition to the profession. Nominees must be less than 40 years of age as of Dec. 31, 2020 and must work in the FM industry. Nominees are not required to be IFMA members or hold a certain title within their organizations.

Nominations will be reviewed by a committee comprised of specially selected and honored IFMA volunteer members and staff members who have contributed to the industry throughout their careers. Finalists will be officially announced and honored at IFMA's World Workplace 2020 in Chicago, Illinois, USA.

Watch for updates on IFMA's LinkedIn, Twitter, Facebook and Engage sites, and visit **ifma.org/40underforty**

President and founder of the World League for the Right to Happiness Murielle van Boxem Drax-Hilton presents the Trèfle d'or to Paemen at a ceremony in Paris, France.

IFMA EMEA director accepts Golden Clover award on behalf of the association

In November, IFMA EMEA director Lara Paemen accepted the Trèfle d'or, or Golden Clover, from the World League for the Right to Happiness for IFMA's outstanding efforts in the region. Each year, the Golden Clover is awarded to personalities and companies involved in promoting happiness. Recipients automatically become Honorary Members of the League.

Free of any political affiliation, the World League for the Right to Happiness was created in 2010 as a philanthropic, international foundation. The League certifies companies that choose to place their customers' and employees' happiness at the center of their organizations. Based on international guidelines in 14 areas, the League's Happiness certification™ offers a model of organization completely suited to the challenges of the 21st century.

To learn more, visit **righttohappiness.org**

> *"With this new Delta Prize, we are expressing our appreciation for practice-oriented research. Professors Van Staa and Mobach stand for change and are real ambassadors for practice-oriented research."*
>
> *– Dutch Minister of Education, Culture and Science Ingrid van Engelshoven*

Mark Mobach, Ph.D. of Hanze UAS receives Deltapremie award

In November, professor of IFMA Foundation Accredited Degree Program the Institute for Facility Management of Hanze University of Applied Sciences, and member of IFMA's FM Research and Benchmarking Institute's board of directors Mark Mobach received the Deltapremie, or Delta Prize, award from Dutch Minister of Education, Culture and Science Ingrid van Engelshoven in Amsterdam.

The Delta Prize is a new leading award in the Netherlands for applied research at universities of applied sciences. Practice-oriented research has gained a solid place in Dutch society. Almost 700 professors and more than 3,000 teacher/researchers are currently involved. Finding solutions for practice-based problems, practice-oriented research provides applicable solutions to societal challenges.

Mobach was praised by the assessment committee for the impact his research has had on the crossroads of various domains, from public transport to mental health care. Devising better space and services in a multidisciplinary setting together with students, lecturers and researchers, Mobach's research contributes to better offices – and even cities – that encourage healthy behavior, better care buildings that reduce stress, and better prisons and stations that meet the needs of society.

"We see the prize as an enormous encouragement to continue, together with our partners, with our research into space and organization in health care, education, offices and cities. Even where there might be fewer financial opportunities, such as research with the arts and well-developed buildings for vulnerable groups in society," said Mobach.

The Delta Prize is an initiative of the Netherlands Association of Universities of Applied Sciences (Vereniging Hogescholen) and the Dutch Taskforce for Applied Research (Nationaal Regieorgaan Praktijkgericht Onderzoek SIA) and is awarded to two professors every two years.

UPCOMING EVENTS

World Workplace Europe 2020
March 18-20, 2020
Amsterdam, The Netherlands
worldworkplaceeurope.ifma.org

World Workplace Asia 2020
April 7-9, 2020
Singapore
worldworkplaceasia.ifma.org

IFMA's Facility Fusion 2020 Conference and Expo
April 14-16, 2020
San Francisco, California, USA
facilityfusion.ifma.org

IFMA Global Canada
June 10-12, 2020
Toronto, Ontario, Canada
ifmaglobalcanada.ifma.org

IFMA's World Workplace 2020
Sept. 30 – Oct. 2, 2020
Chicago, Illinois, USA
worldworkplace.ifma.org

beta Built Environment Technology Alliance

BETA drives discussions on what tomorrow's built environment will look like

The Built Environment Technology Alliance (BETA) was established to help guide how technology will shape and integrate into the built environment. An affiliate group of IFMA, BETA is comprised of facility and technology professionals and organizations working to drive conversations on built environment innovation and technology best practices.

Led by past IFMA board member Darrel Smith and global chair of IFMA's Technology Community Ted Ritter, BETA hosted an inaugural event last year in California, USA. The pop-up conference facilitated interactive discussions among attendees on the impacts of technological advancements on the FM/CRE industry.

Keynote speaker L.D. Salmanson, CEO of Cherre discussed the benefits of investing time in artificial intelligence (AI). In addition to outlining four strategies needed to develop AI for a specific-use case – (1) It all starts with the data; (2) Collect everything; (3) Connect everything; and (4) Tag everything – Salmanson also identified AI applications that could immediately help the FM/CRE industry:

- NLP of documents (mortgage rates or lease terms)
- Image classification (categories risk review, features, violations)
- Behavioral data (likelihood to buy or sell, when and at what cost)
- Valuations and comparables (transaction price and terms)
- Building automation (reduce energy costs, maximize space)
- Facility management (predict AC failure, reduce staff)
- Security (predict irregular building access or data usage)

Following a video of the first life-size social robot Sofia addressing the United Nations, attendees were asked whether they would "hire" Sofia. Opinions on whether they or their organizations were ready for that level of tomorrow were evenly split.

To learn more about BETA or to join the conversation on technology in the built environment, **visit smartbeta.tech.**

ASHRAE releases updated versions of Standard 62.1 and 62.2

In November, ASHRAE released updated editions of its standards for ventilation system design and acceptable indoor air quality (IAQ).

ANSI/ASHRAE Standard 62.1-2019, Ventilation for Acceptable Indoor Air Quality, specifies minimum ventilation rates and other measures for new and existing buildings that are intended to provide IAQ that is acceptable to human occupants and that minimizes adverse health effects.

Significant changes to Standard 62.1 include:

- New informative tables of ventilation rates per unit area for checking new and existing building ventilation calculations
- Simplified version of the Ventilation Rate Procedure, improving calculations for system ventilation efficiency and zone air distribution effectiveness
- Modified Natural Ventilation Procedure calculation methodology
- Revised scope to specifically identify occupancies previously not covered
- New requirement that natural ventilation consider the quality of the outdoor air and interaction of the outdoor air with mechanically cooled spaces
- Humidity control requirements now expressed as dew point instead of relative humidity

ANSI/ASHRAE Standard 62.2-2019, Ventilation and Acceptable Indoor Air Quality in Residential Buildings, defines the roles of and minimum requirements for mechanical and natural ventilation systems and the building envelope intended to provide acceptable indoor air quality in residential buildings.

The 2019 edition of Standard 62.2 adds a compliance path that gives credit for particle filtration, distinguishing between balanced and unbalanced ventilation system interactions with natural infiltration, requiring compartmentalization limits for new multifamily dwellings, and allowing for single-point envelope leakage test results to be used when calculating infiltration credit.

Have relevant FM industry news to share?

Submit your news to be considered for inclusion in the Industry News section of the next issue of FMJ. Send us an email at **communications@ifma.org**

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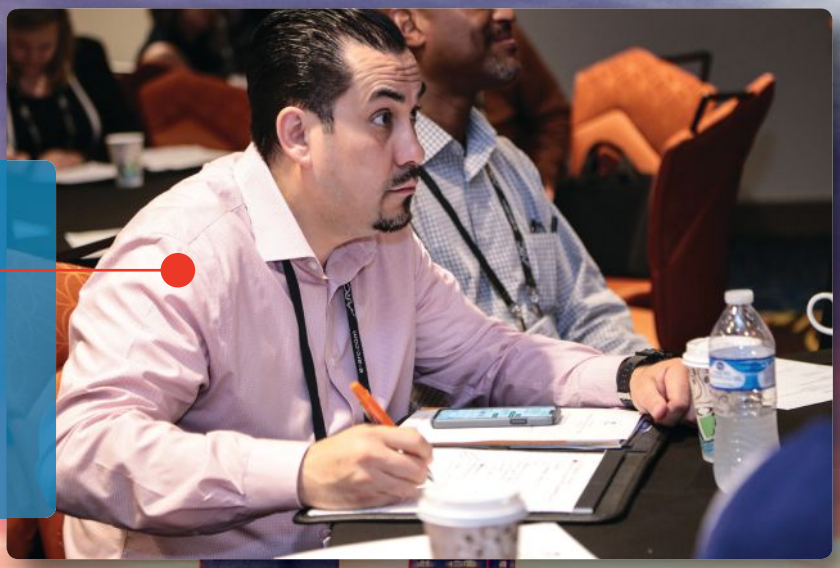

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LOOKING BACK TO GET AHEAD

BY ANTHONY MADDOX

At the Georgia Institute of Technology in Atlanta, Georgia, USA, students are encouraged to challenge themselves and think about what's next. What's the next business idea or invention, where is society and its demands leading industry? Students were recently challenged to research what is next in facilities management. To understand the industry's future, students researched building system history.

Most major building technologies in use today in commercial facilities was invented between 1870 and 1905. During this 35-year span, present-day systems the telephone and air conditioning were conceptualized and implemented. Technologies such as the lightbulb and electrical distribution systems created in 1878 totally transformed not only the quality of human life but revolutionized the world. Their material components have changed, and the sequence of their operations have created efficiencies however, the concept and function remain the same. A chiller is still a chiller and its main function is to cool the building.

Most breakthroughs in technology have been derived by the needs and issues in that present-day society. Air conditioning was created because there was a loss in production time at a printing company due to high heat and humidity in New York. The lack of HVAC technology created limited building footprints due to window ventilation being required. The sprinkler system was created by a piano manufacturer, Henry Parmelee, to preserve his products, materials and building from total loss due to the extreme response time for firefighters. It was also motivated by the attempts to reduce high insurance rates due to total loss of products and buildings from fires.

In examining history, building systems have also integrated and compiled upon each other and with other systems. It was Warren Johnson's invention of the thermostat and controls system that integrated with Willis Carrier air conditioning equipment to form into what is known as the modern-day Building Automation System. It was the combining of the telephone system of Thomas Edison (AT&T) with the Holmes Burglary Company and American District Telegraph (ADT) to create what is known as the modern security system.

Without these building systems, many modern-day businesses could not function. However, it is the FM's duty to maintain these new building systems to promote a functioning and safe company environment. However, where do they go from here?

With the emergence of the computers, tablets, the internet, Wi-Fi and smartphones, building systems have soared to new heights and have created high performing buildings.

High performing buildings are defined as "A building that integrates and optimizes on a lifecycle basis all major high-performance attributes, including energy [and water] conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality and operational considerations."[1]. Although there is no true definition for high performance systems, building systems have been classified as smart systems geared to reduce operating and utility cost and limit the probability of failure through a series of notifications.

The next level and building advancement from high performing buildings is transforming into intelligent buildings or artificial intelligence. IFMA defines an intelligent building as, "A building designed with extensive use of sensors, microprocessor controls and automated systems and able to detect, diagnose and control the response to varying environmental conditions or operational requirements."

This particularly means that buildings must have some level of AI to think for itself in situations that could yield cost savings but would not pose safety hazards. For instance, if an advanced building had solar panels and most of the exterior cladding was glass, the building would automatically raise shades, turn off lighting and capitalize on energy shedding from solar panels while keeping solar heat loads into consideration. Balancing energy from both lighting and a cooling perspective without human interaction.

For the building to achieve this level of intelligence, the building must have Intelligent Building Systems, which IFMA defines as "an integrated building automation system for a physical plant that is linked with corporate business systems so that management is kept fully briefed on cost, efficiencies and trends in operating systems."

The problem that the FM industry is having with achieving IBS is interoperability and the inability to integrate building software and platforms. Each building system is smart, however there has not been a successful or emergent platform to have everything integrated to talking to each other, unless it is bound by a proprietary system and its offerings. Even when most companies find an integration platform that comes close to this theory, there has always been other building systems that do not integrate or meet the quality standard of integration that the facility requires.

This leaves the FM stuck with learning three or four complex building system programs to review, manage and modify. Not only will the manager will have to extrapolate different meanings but compare these system platforms with financial software and work order management systems. Additional cost is also a concern as each system needs licensing and upgrades to their proprietary systems.

The main solution to this issue is creating an integrated platform that communicates, analyzes, manages and controls each system not by manufacturer, but by another unified protocol. This platform should also include integration with work order, financial, energy management and building system automations. With the creation of Building Automation and Control networks, which is a communications protocol, equipment and systems can share information with each other. However, commanding each proprietary software to share to fully integrate has not reached its full potential.

Only time will tell which integration approach will succeed, however it is evident with minimization of staff, budget constraints, the rise of utility cost and the advancement of technology, IBS will be the next step in building modernization. The biggest question is what will be the FM's role and how will they adapt to the new change and challenges?

This is why the IFMA Foundation and IFMA accredited colleges and universities are so important. Existing and incoming facilities professionals will need to become retooled not only with new skills to manage IBS, but on gaining a new perspective on how to analyze and apply the data that IBS has learned. Will new trends or social habits become apparent with the data? Will particular space utilization display a decrease or increase of use? What will that mean and how can the data be extrapolate to its optimal use? These new skills will allow facilities to become an invaluable part of the company as more facilities age and affect the financial bottom line. The IFMA Foundation provides these learning tools through scholarships to conferences and post-secondary learning to access invaluable resources. FMJ

Anthony J Maddox *is the Director of Facilities Construction & Maintenance with Charlotte County Florida USA. He provides strategic leadership and operational support for county facilities maintenance, security and capital building projects. Anthony has worked in facilities/construction management for more than 15 years within the private, public, and non-profit sectors. Anthony earned his bachelors degree from Southern Polytechnic State University in Construction Management and is pursuing his masters from Georgia Institute of Technology in Facilities Management. Anthony has been an active member of the International Facilities Management Association (IFMA) since 2008 and has been the recipient of awards such as the 2013 Achievement in Facility Management and 2014 Emerging Professional.*

1. Energy Independence and Security Act 2007 401 PL 110-140

Leveraging Low Speed and Electric Vehicles for Instant Impact

BY KEITH SIMON

An FMJ reader once described sustainability as "using our resources wisely, efficiently and effectively." There are a lot of ways to define sustainability, but this one aptly pertains to vehicle fleets. Fleet sustainability efforts can be successful within existing budgets by focusing on gradual replacement to an all-electric, right-sized vehicle. Even more simplified — it's about using the right tool for the job. A full-size pickup truck is not always practical or necessary just because an open bed or cargo space is needed.

Telematics research conducted on campuses in the U.S. showed that vehicles were idle 17 percent of the time, causing unnecessary CO_2 emissions, noise pollution and unnecessary fuel consumption. This same analysis found that six of the seven vehicles traveled less than 25 miles a day. And because the seventh vehicle traveled extra for personal use, each vehicle was a prime candidate to be replaced with an electric vehicle.

Low Speed Vehicles (LSVs) – also known as Neighborhood Electric Vehicles (NEVs) – and indoor electric vehicles can reduce spending on vehicle fleets, increase vehicle utilization, reduce danger and liability to vehicle operators, pedestrians and cyclists and coworkers, as well as reduce the CO_2 footprint of the fleet in a real, actionable and affordable way. But not all electric vehicles are created equal. How does a facility manager choose the right electric vehicle?

1. Understand Electric Vehicle Classifications

LSVs are a class of vehicle created by the U.S. Department of Transportation (DOT) more than 20 years ago. All LSVs have a top speed of 25 mph, gross vehicle weight rating of less than 3,000 lbs. and are legal to travel on public roads with posted speed limits of 35 mph or less. Safety features are also a major factor for the classification of LSVs because they require seat belts, four-wheel brakes, safety glass windshield. This means they can replace trucks, vans and other over-the-road fleet vehicles.

Some LSVs also follow the higher SAE 2358 standards set by the Society of Automotive Engineers. This ensures the LSV enhances the safety and comfort of the occupants by using as standard three-point seat belts, high seat backs and other additional features. Vehicle application packages are available to meet specific needs for shuttle service, campus transport, maintenance, repair and operations, construction, technician, delivery, housekeeping, grounds crew, safety and security.

Electric vehicles for indoor applications require a different set of options. Some of those options take priority dependent on the vehicle application:

- Safety features, including lights, horns and backup alarms
- Operator ergonomics, including stand-up and sit-down operator options
- Payload capacity and hitch assemblies to pull carts
- Non-marking tires
- Tight turning radius
- Customization and application packages
- Smaller vehicle sizes for tighter spaces
- On-board chargers

2. Prioritize Purchase Criteria

Sustainability is just one of three major purchasing priorities that influences vehicle fleet purchases for facility managers. Safety and budget/resources also factor in and need to be addressed before any vehicle purchase.

SUSTAINABILITY: How to keep people and the environment healthy and how to reduce green-house gas emissions and pollutants? The first, second and fourth warmest years on record are 2016, 2017 and 2018, respectively. Emissions from internal combustion engines are an increasing issue in urban environments and closed campuses.

SAFETY: How to keep people safe? Distracted pedestrian deaths made up 16 percent of traffic fatalities in 2017 in the U.S. while the combined number of all other traffic deaths declined by 6 percent. Preliminary data indicates 2018 will have the highest pedestrian deaths on record since 1990.

On the road, LSVs are lighter weight and lower speed, which means less likelihood of collisions and less damage when accidents do occur. Operating non-street legal vehicles in traffic or on any roadways is a risk that FMs should avoid. It puts the operators and pedestrians at a great physical risk while exposing the FM's organization to liability and financial risk.

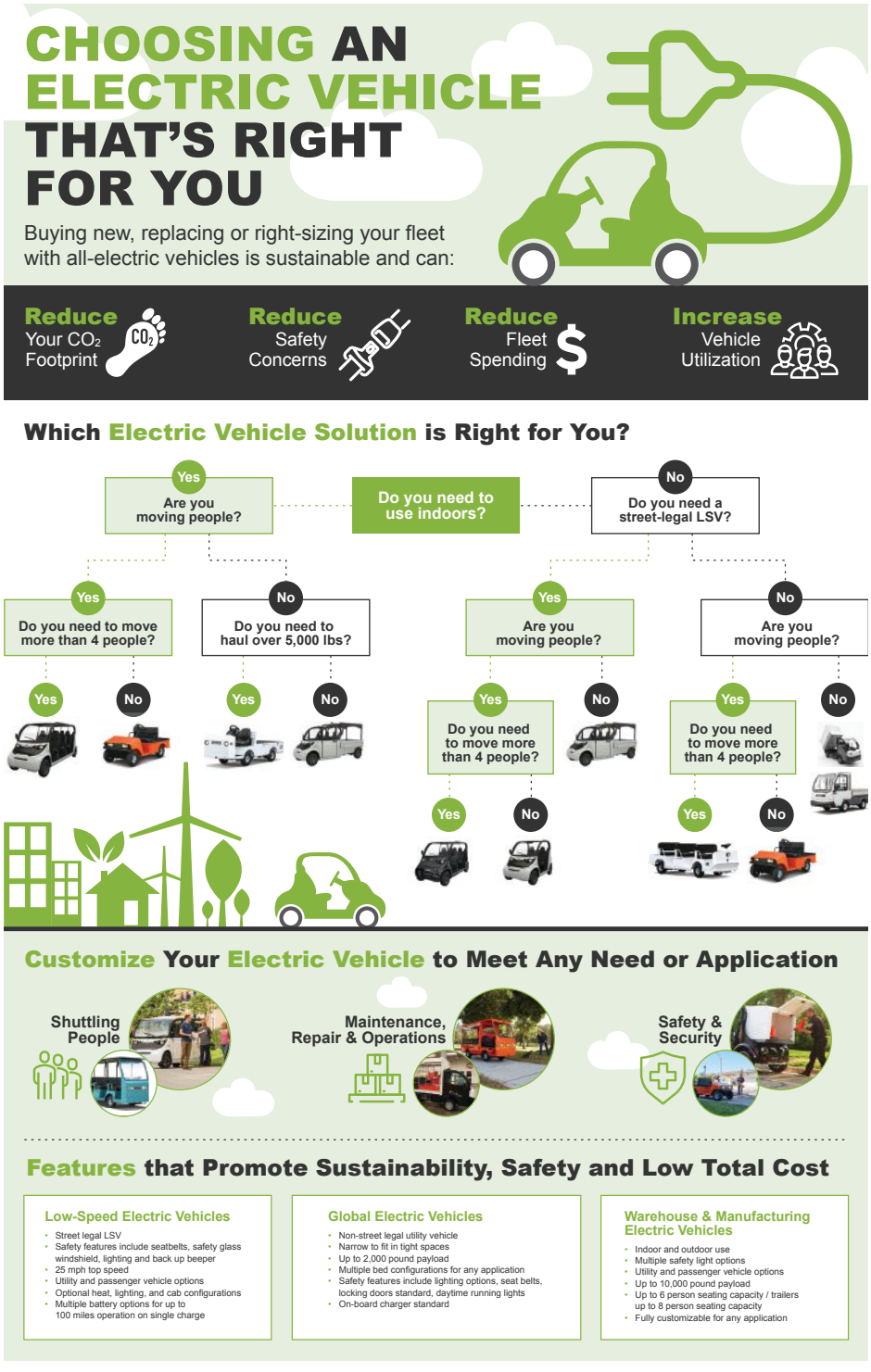
Indoors, electric vehicles can move materials horizontally safer than forklifts, which have poor visibility. Horizontal material handling can consist of an electric tow tractor with true-tracking tires. Lights, audible alerts and e-stop buttons increase safety even more.

BUDGET/RESOURCES: How to maximize resources and operational efficiency? Do more with less. For cities, this means maximizing real estate for increased tax revenue (often times leading to less parking facilities) and mitigating litigation costs of pedestrian accidents. Some states in the U.S. faced revenue shortfalls in 2017 despite a growing economy. For U.S. colleges and universities, the average state spent $1,448 less per student in 2017 than in 2008. Also, 18 states cut funding by more than 20 percent.

Today's EV providers can offer a connected electric vehicle platform for access to both technical vehicle and battery management data, encompassing logistics services, maintenance, green areas and waste management to customers.

This new electric vehicle technology enables facility managers to:

- Measure real-time electric vehicle and battery specific information with configurable alerts to ensure smart vehicle usage and sustainability objectives are met
- Send and receive electric vehicle and battery health maintenance-related alerts and updates to facility managers
- Proactively manage any warranty and vehicle usage plus charging patters in order to improve efficiencies and facilitate smart charging
- Encourage eco-driving habits to improve safe and environmentally sustainable practices
- Increase efficiency through improved fleet management across a mixed fleet environment



3. Identify Quick Wins for Sustainability with Current Resources

Most FMs aren't making sweeping replacements of equipment, but rather a little each year. LSVs enable progress towards sustainability goals while reducing fleet total cost of ownership while allowing operators to achieve their daily tasks.

CASE IN POINT: One U.S. state looked at its sustainability efforts and recently approved legislation so that every time a state-owned vehicle is up for replacement, an electric vehicle needs to be considered instead. This doesn't mean that it will make sense for every internal combustion engine car, truck or van to be swapped for an LSV, but many will and the impact is immediate and can be significant.

4. Find the Right Vehicle to Reduce Fleet Costs

The total cost of ownership of an LSV is typically around 60 percent that of a traditional highway vehicle in the same application. On average, conversion to LSVs from highway vehicles lowers TCO by $18,000 more than years per vehicle; such savings are significant with larger fleets.

A total cost of ownership savings projection for the same state's fleet was based on the assumption of 10 percent conversion of the 12,286 vehicles in service over a seven-year replacement cycle. With direct input and conversion rates, a tailored projection and soluti can be calculated. The total cost of ownership analysis considers a comprehensive list of variables like local fuel and electricity cost, acquisition cost, cost of operation, residual/resale value, vehicle replacement cycle, maintenance/repair cost and more. These variables can be adjusted to customize the analysis to specific conditions.

The analysis in this example does not assume that 10 percent of the fleet would be converted at once but rather staggered throughout seven years per the typical replacement cycle. As such, LSVs maximize total cost of ownership savings without additional capital from the status-quo.

5. Choose the Right Battery

LSV manufacturers often offer a number of battery options to fit all job needs, from standard lead acid batteries to large lithium Ion battery packs. The right battery will meet the range requirements, size restrictions and price point for the application. Field specialists can help choose the right battery for an application, weighing factors such as affordability, maintenance and range. Not all electric vehicles require a special power station as many can be charged by any standard outlet.

Using LSVs as shuttles is revolutionizing urban mobility. The plague on parking and congestion has been alleviated with proprietary apps and free shuttle service — whether driven or

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Urban mobility challenges are increasing throughout the U.S., specifically across cities and college campuses.

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By 2030, **84.2 percent** of the U.S. population will live in urban areas

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Can cost **2–4 percent** of total national GDP by measures of lost time, wasted fuel, and increased cost of business

ERODING PUBLIC TRANSIT RIDERSHIP

Ridership declined **7 percent** in top 50 cities (excluding NYC) since 2008

PARKING COSTS REDUCE URBAN GDP

A mixed-use building can generate **US$413K** in tax revenue per acre over parking

DISTRACTED PEDESTRIANS

In 2017, **162 percent** of traffic fatalities were pedestrian deaths

AIR POLLUTION

4.2 million premature deaths were due to outdoor air pollution

UNNECESSARY POLLUTION

Vehicles idle **17 percent** of the time of in many urban operations

EXPENSIVE, LARGE VEHICLES BEING USED INEFFICIENTLY

In many urban operations, internal combustion vehicles travel less than **25 miles** a day

operated autonomously. U.S.-based Circuit (formerly The Free Ride) and California-based FRAN (Free Rides Around the Neighborhood) use LSVs as on-demand micro-transit systems helping cities and congested areas bridge the first/last mile of a visitor's journey using shuttles.

The idea for an autonomous shuttle service emerged to tackle areas in the most need of viable transportation options due to high density, congested traffic and over-developed parking lots. FMJ

Keith Simon *is the vice president and general manager for Polaris Commercial North America. Under his leadership, he has catalyzed Polaris' consolidated electric vehicle manufacturing operation in Southern California, home to the company's GEM and Taylor-Dunn brands. His previous positions include director of operations, plant manager and several engineering jobs. Simon has a degree in Mechanical Engineering from the University of Alabama in Huntsville and an MBA from Washington University in St. Louis.*

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Retaining the Library

BY **SURI SURIYAKUMAR**

Most facilities managers stay in their jobs for decades. Over their careers, they become intimately familiar with their buildings and operations. They know the location of every piece of equipment, and where to find the critical shut off valves for water, electricity and gas. They know where emergency equipment is and have memorized the emergency and life safety procedures. Most of them are walking, talking libraries of key information. They do not have to look at blueprints or manuals, they simply know their buildings by heart.

And then they retire, often taking this highly specialized information with them.

Retiring facilities workers and the resulting information loss have been a troublesome issue for the FM industry forever, and it is about to become even worse. Surveys show most senior facility professionals are baby boomers and 60 percent of them are likely to retire in the next four to six years.

Information Management in Facilities Management

Facilities management is inherently complex in terms of information management and record-keeping requirements. As large building complexes age, they go through hundreds if not thousands of changes depending on their size and type. The physical structure changes depending on occupancy needs, equipment is repaired or replaced, plumbing and electrical systems are updated due to age or as regulatory requirements evolve, and the list goes on. All this information must be recorded and maintained year after year to ensure facilities stay operational, safe and efficient.

Keeping track of all the records and information that comes with these changes for legal, operational and financial reasons is a challenge. But accessing this information when it is needed most is an even bigger issue. In a crisis, a few minutes saved can make the difference between solving a US$100 problem or a $100,000 problem. In the worst cases, getting information quickly can be the difference between life and death.

FMs fill a critical role when time is of the essence. While their skills as document and information managers are important, what they know and how quickly they can convey it can prove vitally important. As these key players retire, the knowledge transfer must be executed carefully along with new hires or promotions needed to replace them. Even with the best planning, it is a tall order given the nature of the industry and the complexity of the information.

Why is FM information so complex?

Two of the primary factors contributing to information complexity are the number of professionals and the amount of information they generate on a given project. Take for example a simple building extension or a tenant improvement project. Depending on its size, the project could involve just a few contractors or hundreds of contractors. In addition to architects, engineers and general contractors, there are often subcontractors in trades as diverse as mechanical, electrical, plumbing or landscaping. There are also suppliers of equipment and installation companies. All these orga-

nizations will submit information and details on their work product before they collect their final payment.

This final project information is then put together by the general contractor into a "closeout package" and handed over to the FMs. This is where the biggest challenge lies. There is no standard for how this information is shared. The immense amount of data relating to the project (including every change order and revision during the construction process) including "as-builts", operations and user manuals, warrantee information, compliance and regulatory information is frequently delivered in multiple formats such as paper, or electronically on CDs, DVDs or flash drives, depending on the individuals who collected the information in the first place.

None of it is organized nor is it structured in a way it can be easily accessed, much less found. Given the nature of their jobs, facilities professionals often need to access the information quickly in the field. Studies show facilities staff waste an enormous amount of time going back and forth to the document storage rooms, searching their desktops or servers daily.

It is no wonder that long-time FM employees simply memorize information rather than relying on physical documents and file management systems to retrieve it.

What risks come with losing your FM to retirement?

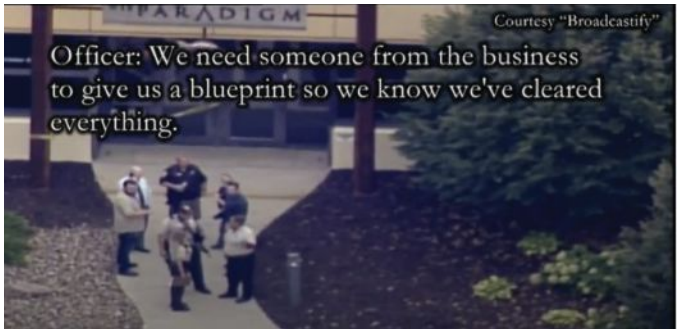
When tenured employees retire, there is not just financial risk, but also often risk related to maintenance, emergency management and tenant safety.

Imagine a leaky or broken gas pipe in a commercial complex like an office building or a hospital. Without instant access to information on shut off valve locations, the damage can easily become debilitating. Additionally, simple accidents can often become catastrophes when ongoing destruction from water, fire or fumes is unable to be contained. There is a myriad of recent examples where the inability to find a simple shut off valve during a water leak has resulted in millions of dollars in damage to buildings.

It is important to note that the problem is not a lack of information — most buildings have relevant information somewhere. The damage is caused by the lack of immediate access to the information.

The recent uptick in workplace, school and institutional violence has highlighted this need to access building information on demand. A recent post on social media showing law enforcement and administrators responding to a school shooting in Middleton, Wisconsin USA offers a chilling glimpse into the problem:

It is becoming increasingly incumbent upon building owners to have facilities information available to first responders immediately when there is a crisis.



How has access to information changed today?

In today's world, even the most technical or obscure information is consumerized.

For example, if someone is about to have knee surgery, a simple search on WebMD or simply by Googling "knee surgery" provides a deep understanding about the different types of surgeries, expert advice, best hospitals for such surgeries, and more — information only a doctor could have provided previously. Likewise, shoppers using a simple phone app can scan the label on a bottle of wine to find its average price, the type of grape that was used, the vintage, where it was made and any tasting notes from recent wine enthusiasts — something sommeliers and wine experts take years to learn.

This common, easily accessed world of information affects almost every aspect of our lives. Whether buying a home, applying for a job or needing to know how to replace a filter in an air conditioner, information to help is at our fingertips. Why should facilities be any different?

If there is a building emergency, shouldn't an office assistant or a security guard be able to find information critical to first responders as easily as someone comparing prices in a grocery store?

What could be a possible solution?

Two challenges present themselves when attempting to provide information access in a "consumerized" way:

1 **The information must be organized and indexed in a way that we can extract the required information from relevant documents when we need it.**

2 **Once we extract the necessary information, we should be able to deliver it in a format that is easy for anyone to consume.**

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Extracting Building Intelligence

While extracting intelligence from the building information gathered over time and stored in multiple formats is a big challenge, recent technology advances allow us to do that. The use of Artificial Intelligence and Machine Learning enables us to extract building intelligence from complex documents in multiple formats. Technology allows us to store all of this data on the cloud, extract this information instantly and deliver it on mobile devices on demand. There has been significant R&D done in this space and papers have been presented in the IEEE conferences* in recent years.

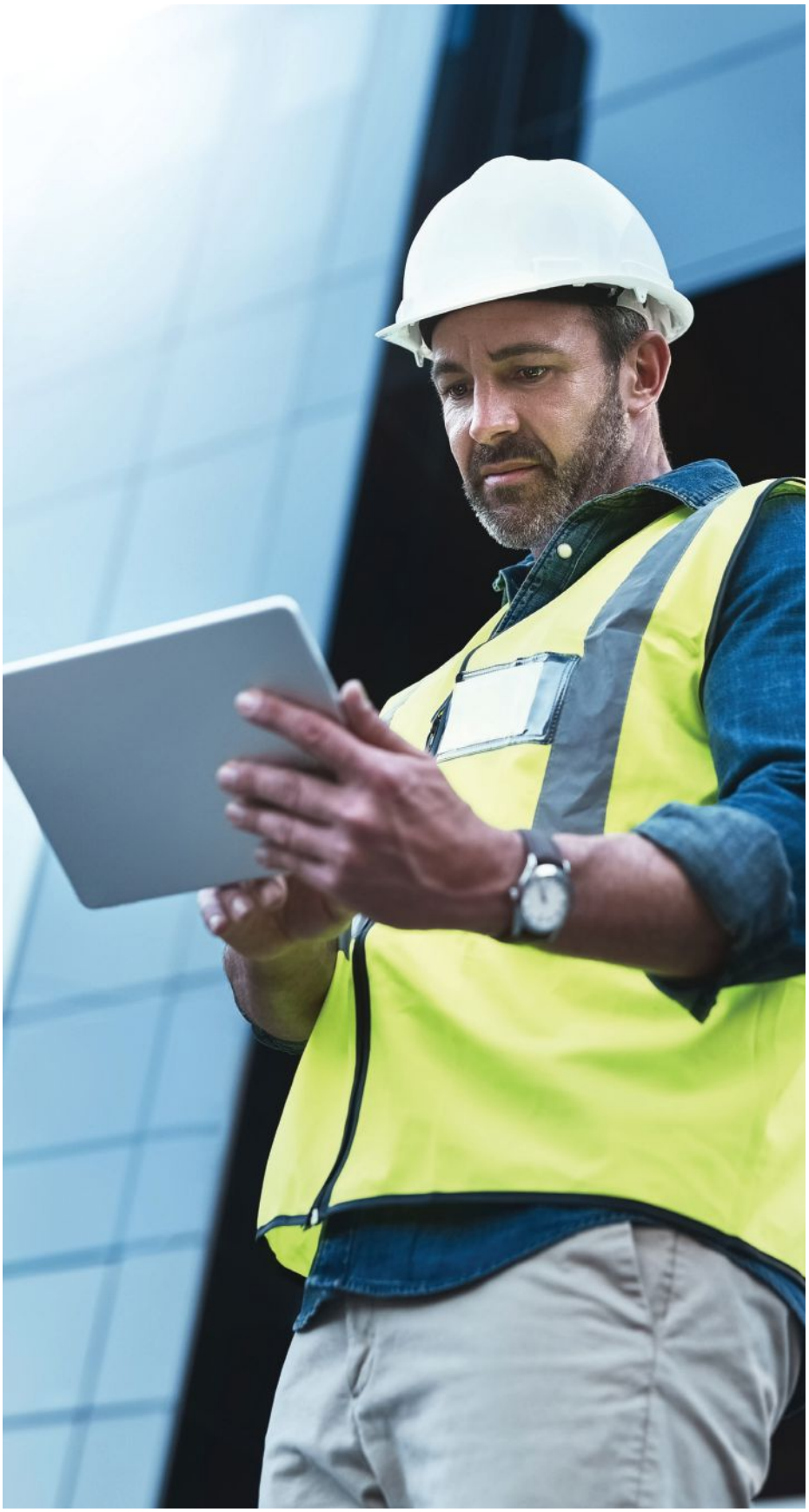
Delivering Building Intelligence

Delivering building intelligence in a format anyone in the organization can consume — not just FMs — is critical. It also solves the problem of information retiring when tenured facilities managers do. While a cloud computing infrastructure is necessary to facilitate accessibility to mobile applications, this infrastructure is available to app developers on a variety of platforms today. For both safety and business continuity reasons, solutions to consumerize our facilities data are compelling.

The Rise of Mobile Technology

Given the rise of mobile technology, it is easier to access complex and detail information on an app. Apps make it easy for users to access information on demand. In today's world, banking, finding a restaurant, checking a home's security cameras or booking a flight all can be done easily through a mobile application. Why should FM be any different? FMJ

Suri Suriyakumar *co-founded and grew ARC Document Solutions into the largest document management/distribution company in the construction space before taking it public in 2005. Since then, Suri has led ARC's investments and initiatives in technology development, including the creation of the leading mobile solution in information access for the built space. He serves as ARC's CEO.*



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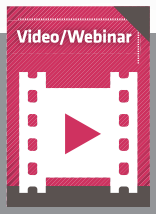

Video/Webinar Service Management 3.0 – The Future Direction for FM

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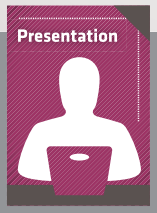

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IFMA Fellows Program: An Introduction

BY BILL CONLEY

IFMA™
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As young people grow and learn how to get along in the world, many look to more mature and experienced individuals for knowledge and wisdom. Ideally, they choose mentors and role models admired and esteemed for their accomplishments.

Within IFMA, there is a group of FMs selected over the last 28 years to receive the designation of IFMA Fellow. This is the most prestigious title bestowed by the world's largest and most widely recognized association for facility management professionals. IFMA Fellows are members who are willing and able to lend their expertise and lessons learned to other FMs and component leaders. They are not typified by age; rather by the investment of time and efforts to reach a professional maturity not yet attained by most FMs.

The IFMA Fellowship program was established to recognize members who have contributed to the organization and the FM profession over a span of many years and are viewed as leaders within the FM community. They are devoted to acting as advisors to IFMA and as ambassadors for the association and the profession.

IFMA's global board of directors provides the leadership, policies and procedures to maintain the association's culture of a member-centric organization. The guidelines for IFMA Fellows reflect this credo, as Fellows are dedicated to enhancing all members' experience within the organization and are ready and able to assist the board with strategic plans and direction. The board also has a fiduciary responsibility to the association and its members. Fellows work closely with the board in this regard, exercising their experience by serving on the audit and finance working groups.

Fellows are an eclectic group. They are teachers, authors, presenters, instructors, philosophers, pioneers and leaders in the profession. They are elected as IFMA Fellows by their peers, based on a rigorous nomination process and the evaluation of their contributions to both the industry and IFMA. They are active IFMA members dedicated to enriching, educating and enhancing the careers of FMs, acting as guides, counselors and mentors to both the IFMA board and to the membership.

The Three Cs

Chapters, councils and communities (CCCs) promote education, networking and the sharing of best practices. They are mainstays of the organization, offering members a more personal connection within local regions or across specific industries. Fellows are committed to lend their expertise and knowledge to assist in retaining members, as well as recruiting new professionals. They are willing to mentor and promote future leaders by working with CCCs to instill competence and pride in organizational and leadership success. They can work directly with CCC leadership to develop operational and strategic plans, as well as assist with succession planning to support standard IFMA governance structures. They support CCCs and members through teaching and presenting the value of IFMA and are always available as presenters and/or teachers at a CCC gathering, whether it is a monthly meeting or special event. They continually advocate for the IFMA credentials and education for members. They make themselves available to teach courses at the CCC level and assist in the development of IFMA courses in collaboration with staff.

Fellows are also leading the charge on the Appreciative Inquiry (AI) process for the CCCs. This strategy worked well for the association as IFMA has taken an impressive turn for the better after having gone through this program. AI is based on one-on-one discussions with members to discuss the future of FM and components in a positive light. It focuses on aspirations and encourages members to think about taking positive steps forward when planning component activities and engagement.

And There's More...

Other initiatives being undertaken by the Fellows revolve around creating awareness of changes in the workplace, centering around innovation, technology and sustainability. They are motivated to engage and guide future IFMA leaders and to educate them on developing trends in the industry, serving as advisors to CCCs, IFMA staff and the board of directors on cutting-edge FM development. Due to their broad global reach, innate curiosity and the relationships they have developed over time, information and new developments sometimes reach Fellows' ears before they hit the mainstream. The Fellows have taken it upon themselves to refer experts and provide expertise for the advancement of the association and the profession.

To increase global awareness and expand global professional development, a group of Fellows has been actively engaged in developing the new ISO standards focusing on FM. Four standards have already been developed that supply consistency and commonality within the profession on a global basis, while others are still in progress. Fellows who are involved in this task are developing knowledge and expertise in the guidelines to better inform members of their importance and relevance in the FM world. The goal is to have qualified Fellows willing and able to educate members

2019 CLASS OF IFMA FELLOWS

Michael Riseborough, RPA, FMA, AAE, FMP, CFM, IFMA Fellow

Ted Ritter, CBD, PMP, LEED AP, IFMA Fellow

John Vinken, M. Eng., CFM, FMP, SFP, CET, CRSP, CEM, IFMA Fellow

on ISO standards and ensure everyone is aware of the global significance of these documents.

Fellows strive to always provide value on an international scale as a critical resource to the membership and IFMA by promoting and participating in World Workplace in the Americas, Asia and Europe, as well as through program development and involvement with the Awards of Excellence. They facilitate and participate in the World Workplace first-timer sessions, providing tips and guidance on how attendees can optimize their conference experience. Fellows also speak to students who attend the conference, encouraging them to actively participate and take advantage of all the networking opportunities at the conference. They present sessions and are highly interactive at the social gatherings and through the halls. They pride themselves as being approachable and are highly visible at these events by their distinctive red and black tote-bags and the Fellows ribbon.

Fellows are also strong advocates for the IFMA Foundation. They assist in the creation of student chapters and mentoring of young professionals, combined with student outreach programs and internship facilitation. They work with local colleges and universities to encourage FM degrees and to achieve IFMA Academic Program accreditation. The Fellows have created a scholarship in conjunction with the Foundation. The 2019 IFMA Fellows Student Scholarship Award is named in recognition of Francis Kuhn, an IFMA Fellow who was chair of the Foundation as well as the global board. He epitomizes the essence of an IFMA Fellow.

Networks Without Boundaries

The Fellows do not work in a vacuum, nor are they omniscient. They rely on each other and IFMA members to continually add value to the association and profession. Going forward, on a quarterly basis they plan to have a global Fellows meeting either via teleconference or webinar to share best practices among themselves. The goal will be to match up the expertise of IFMA Fellows internationally. They are keen to apply and share lessons learned so other Fellows can assist and guide members and serve as mentors on a global scale within CCCs as requested or through their own initiative.

Within their charter, Fellows are called to serve as spokespeople for IFMA as an organization. The stature and credibility that comes with the title opens doors for public relations at all levels. IFMA Fellows are encouraged to participate in supporting professional development in their regions. They are working with IFMA staff on creating a special group page on the website that will house a Fellows membership directory, listing each Fellow's location, availability and professional mastery.

Fellows partner with the Facility Management Journal (FMJ), contributing relevant and topical articles for the edification of readers. They are active in blogs and create and promote other IFMA publications

The geographic spread of Fellows is global. In North America, there are Fellows in 23 states, with 11 more in Canada. Nine other countries worldwide are also represented, from Australia and the Pacific Rim to Europe, the United Kingdom and Africa. Fellows can help define needs and act as enablers to further IFMA's direction and future on a global scale.

Reach Out!

IFMA Fellows are on call as needed. Long past self-aggrandizement, their passion is to foster success in the organization, its members and the FM profession. They hold their title with pride, doing their best to live up to the expectations that come with being named a Fellow.

The Fellows can always use assistance in these endeavors, from receiving requests to information on new developments in the profession. Through their network and connection capabilities, they are a prime vehicle to spread best practices, advice and guidance. Additionally, they are always looking for qualified candidates to bolster this vibrant group. They ask that members keep an eye out for those FMs who continually go above and beyond for their com-

ponents, IFMA or the facility management profession. Recommendations are always welcome, and for those deserving members, becoming a Fellow will recognize their achievements while affording them a higher platform from which to operate. Fellows are self-avowed volunteers for life. The IFMA webpage lists all the Fellows, as well as the criteria by which deserving members can apply for this prestigious title. Consider becoming one or proposing a candidate. Every member can help IFMA prosper. It will be worth it! FMJ

Bill Conley, *CFM, SFP, FMP, LEED AP, IFMA Fellow, is a facility manager at Yamaha Motor Corp. in Cypress, California, USA. Prior to that, he served as owner and chief sustainability officer of CFM2, a facility management company. 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. Conely 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 70 FMJ articles.*

The Author would like to express his gratitude to IFMA Fellows Pete Winters, Mary Gauer, Teena Shouse, Peggy McCarthy and Kathy Roper for their input and guidance in the development of this article, and to all the Fellows for their continued service to the association and the profession.

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The following people were awarded the Certified Facility Manager® (CFM®) certification in SEPTEMBER 2019:

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Using SMART OFFICES

to create SMART BUSINESSES

BY **ROBERT HEMMERDINGER**

Smart office designs are a popular concept, but what benefits do they bring to the business world?

Today, corporate boardrooms are vying to answer that question, and research is uncovering compelling correlations between office spaces and an organization's output. One such study by Microsoft found employees feel more productive in a digitally minded environment[1]. Research proves smart offices promote productivity, innovation and allow employees to feel more empowered and connected to their companies. These factors are essential to reducing turnover, attracting top-tier talent and ultimately, driving sales.

This growing awareness of how the physical environment influences employee productivity is placing an even greater responsibility on facility managers. While this may sound daunting, reassessing common office functions — lighting, air quality and temperature control — can go a long way toward improving the tenant experience and supporting the bottom line.

Lighting's New Meaning

Lighting is among the most important features in a work environment because it fundamentally affects sight and perception. The National Lighting Bureau notes that lighting can influence mood and behavior, meaning it directly correlates with the ability and desire to get work done.

A plethora of research links poor lighting to a range of negative health effects, from eye strain to fatigue and depression. Given these complications, it is not surprising that 68 percent of employees complain[2] about the lighting in their office. On the flip side, the right lighting can bring a positive impact to employees by boosting creativity, motivation and productivity.

What kind of lighting is "right" depends on a myriad of factors, including how an environment is utilized, the shape of the space and how much natural lighting is present. These variables influence the design choices of building owners and architects, along with the type of lighting they employ. For example, scientific studies suggest that cool light[3] — lighting between 4,000 Kelvin (K) to 7,000K — boosts productivity, whereas warm lighting — around 2,000K — brings drowsiness.

The advent of LED lighting has made it easier for companies to enhance their offerings. A study published in the International Journal of Industrial Ergonomics[4] concluded that employees had faster reaction times when under LED lighting as opposed to compact fluorescents — resulting in a more than 8 percent improvement in performance. Employee morale was further boosted, as cited by an Indoor and Built Environment[5] study, through the pairing of LED lighting with natural sunlight using daylighting techniques.

Daylighting, or intentionally harnessing sunlight and pairing it with LED systems that dim or brighten based on natural ambient light levels, is a key component of human-centric lighting. This idea asserts that sunlight's natural adjustments in intensity and color temperature throughout the day correspond to human physiological processes, such as sleep and metabolism, otherwise known as circadian rhythms. These automatic lighting changes — which artificial light lacks — lower stress and depression levels, translating to happier and more productive employees.

However, the industry has learned that a one-size-fits-all approach to lighting is not the answer. Everyone responds to color temperature differently. Control and customization are critical to improving productivity in the long run, so each employee can work under their own ideal circumstances. Fortunately, LEDs offer more control options than any light source before them, creating many opportunities for building managers and occupants to refine lighting infrastructure in a way that maximizes mental and physical well-being.

Poor air quality has resulted in many reported health problems among office workers, including Legionnaire's disease, asthma, hypersensitivity pneumonitis and humidifier fever.

Importance of Indoor Air Quality (IAQ)

Americans spend about 90 percent of their time indoors, in spaces where air pollution is often two to five times greater than the outside, according to the U.S. Environmental Protection Agency[6]. While people can control indoor air quality at home through regular ventilation system maintenance and opening windows, employees generally have far less say in a work setting.

Over the past few decades, many office spaces have evolved to become increasingly stiff and sealed off. These changes reduce energy costs, but they also keep in unwanted particles. Without an adequate ventilation system, pollutants generated from furniture, kitchens, nightly cleanings and pesticide applications will remain in the space.

Poor air quality has resulted in many reported health problems among office workers, including Legionnaire's disease, asthma, hypersensitivity pneumonitis and humidifier fever. Poor IAQ causes mental deficits as well. A small but growing body of research[7] has drawn a connection between heat and carbon dioxide — which commonly build up in conference rooms — and a decline in cognitive function. Specifically, inhalation of the gas at higher-than-average levels dilates blood vessels in the brain, reduces neuronal activity and decreases communication between brain regions.

Fortunately, many ways are available to address IAQ, including proper garbage disposals and maintaining air vents. Ensuring regular maintenance of the heating, ventilating and air conditioning system has been made easier as a result of advances in building automation and management technologies.

The Battle of the Thermostat

Office temperatures are often a point of contention among employees, with thermostat wars erupting in the summer and winter months. According to a CareerBuilder survey, 46 percent complain their office is too hot or cold[8].

Researchers have attempted to understand the biological origins of this debate. However, a study published earlier this year in PLoS ONE shows that this may be more difficult said than done[9]. A team at the University of Southern California Marshall School of Business assessed how male and female students performed on math, verbal and cognitive tasks at temperatures ranging from 61 to 91 degrees Fahrenheit.

It found that women perform better at temperatures between 70 and 80 degrees, but men's optimal temperatures were below 70 degrees. Furthermore, women

were found to be "more negatively impacted by colder temperatures than men were by warmer ones.[10]" The research marks a critical step forward in understanding why thermostat wars occur but leaves facility managers without a clear answer on how to stop them.

Evidently, a uniform approach to temperature control is not suitable for the modern workforce. Building owners and facility managers must break away from the empirical thermal comfort model popularized in the 1960s — when the workforce was dominated by men — and embrace a more customized and inclusive approach to heating and cooling.

Occupancy and Asset Sensors Help Buildings

Many offices are testing tools like voice commands and mobile apps to overcome disputes by giving occupants greater control. FMs face the tall order of fulfilling this demand by providing occupants with ample control capabilities that can be adjusted to extremely granular levels. This could mean lowering the temperature and dimming the lights in the conference room ahead of a big meeting, adjusting the temperature on one side of the office because multiple employees report feeling cold or alerting employees to an open meeting space.

Monitoring and analyzing occupancy patterns are critical to these capabilities but require a sizeable investment in sensor-based solutions to undertake such specific actions. Otherwise, FMs cannot effectively hone in on and execute precise temperature, lighting or ventilation changes. Other forms of sensor technology, such as indoor location asset tracking of both people and equipment, is demonstrating clear value for the bottom line. For instance, operations for tracking open parking spaces or available EV chargers or renting equipment can reduce conflicts and ensure an efficient use of resources. These technologies help companies to stay ahead of employee demands with real-time data.

Furthermore, understanding where employees are at a given time can have a considerable impact on employee happiness and productivity. Simple actions such as using automation to open blinds in the morning to let the sun in and dropping them in the afternoon to avoid glare can improve volume and quality of output.

Sustainability Gains Traction

In today's unusually strong labor market, businesses must bring more to the bargaining table. According to a survey released by the U.S. Green Building Council last year[11], the competitive edge could be a company's office space. The organization found employees who work in Leadership in Energy and Environmental Design certified buildings are happier, healthier and more productive than employees in conventional buildings.

Overall, 90 percent of respondents in LEED-certified green buildings said

they were satisfied on the job. Nearly 80 percent claimed they would choose a job in a LEED-certified building over a non-LEED building. Employees attributed this high level of satisfaction to many of the core design tenets associated with LEED structures, including ample access to outdoor views, exposure to natural sunlight and improved indoor air quality. Fortunately, these features also are financially favorable[12] for building owners and facility managers. LEED-certified buildings consume 25 percent less energy and 11 percent less water, according to the USGBC.

As building automation technologies advance and more sensors enter the office, building control functions can grow to be more precise, dynamic and intelligent. These enhancements, paired with the proper office design, will make it easier to achieve and maintain LEED status, even as requirements and demands evolve.

However, this influx of sensors can have an unintended consequence. Affectionally dubbed "wall acne," this web of equipment can overtake walls and ceilings, creating a disorderly appearance and detracting from the sleek designs of today's modern businesses. Solutions like sensor hubs, which enable brands to consolidate smart occupancy functionalities into a single device and store them out of sight, are rising in popularity by offering ways for facilities to bridge the gap between aesthetics and automation.

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Future is Bright for Smart Offices

Occupant demands are poised for major change as technological advances like IoT and 5G move mainstream. FMs will be faced with tough decisions on when and how to integrate these functionalities. There is no all-encompassing solution, but already a wealth of options exist today that can create unprecedented control and customization opportunities. These enhancements can transform an office environment to improve morale, productivity, retention and the bottom line. In today's complex business landscape, these little advantages in comfort will set brands and buildings apart. FMJ

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2. https://www.lightingdesignlab.com/resources/articles/articles-lighting-productivity/lighting-productivity
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7. https://iaqscience.lbl.gov/vent-info
8. https://www.careerbuilder.com/advice/thermostat-wars-too-hot-or-too-cold-where-do-you-stand
9. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0216362
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The next steps for FM and CRE

BY STEVEN FOX

Effective workplace collaboration is no longer just a nice-to-have – it has become a critical goal and prerequisite for maximizing individual and organization-wide performance at virtually every business today. And yet when it comes to corporate real estate and facilities management departments, all too often the CRE and FM teams appear to be on the margins in terms of C-suite visibility, their role in managing company processes and their input into strategic initiatives. The result is poor efficiency and a failure to maximize on opportunities.

All of that is ripe for change, however, as the use of PropTech by corporate occupiers with significant real estate portfolios promises to empower CRE departments, enabling them to wield influence and proactively improve decision-making within their businesses. Not everyone is capitalizing on PropTech's potential to put more effective property and asset management at the forefront, but those that do are giving their organizations a competitive edge and gaining clout in the boardroom.

Bringing CRE and FM to the forefront

Often, organizations focus only on the cost and resource requirements of managing real estate and facilities without fully appreciating how it can fundamentally drive strategic and operational success. Consequently, CRE and FM strategies are not aligned with broader business objectives.

Consider retail. Here is a prime example of how business success — or potentially failure — is often defined exclusively by sales, and yet property can make or break the selling process and shape margins. Indeed, locations, dimensions, lease terms, presentation, the way properties are managed, their upkeep and the way space is utilized all shape the way the business functions and how customers perceive and interact with the brand.

The same scenario applies to any corporate occupier with a sizeable or high-value real estate portfolio. Real estate and the way it's managed can, in fact, have a significant impact on business. Furthermore, when CRE and FM teams embrace their role in driving success for an organization, they can establish a critical, strategic leadership position within their enterprise.

Where property teams are empowered and working in collaboration with other departments — such as finance or business development — they are able to provide analysis on occupancy rates and return on investment (ROI), help to manage and influence rent costs and inform strategic decision-making on investment in both under- and over-performing units. What's more, CRE and FM teams can enhance the workplace, providing data-driven insights to C-suite executives regarding property operations and building environment and offering choices that can shape and encourage better employee interaction, collaboration and productivity.

Overcoming silos to enable collaboration and joined-up thinking

Too many organizations are hamstrung by a silo mentality that strangles collaboration and leads to massive inefficiencies. This may be a result of long-standing personnel who are vehemently opposed to change, inflexible management structure that resists new ideas and processes, or simply the spread of operations across different geographies and business functions. When a silo mentality becomes entrenched, individual resistance to change presents a major hurdle to achieving transparency and cooperative working across departments, which hinders productive collaboration and shared strategy.

For CRE and FM departments specifically, there has historically been a clear distinction between property and finance despite a few joint interests such as ensuring payment of the correct rents. If a finance decision is taken without visibility into accurate property data, then that department is making significant judgements without having to hand all the information it should be considering and, as a result, not working effectively together towards a shared objective.

The same sort of disconnect applies to many big international organizations' regional operations, which may be dispersed and run separately — and can even be separate subsidiaries and legal entities. This can lead to local teams following and instilling their own processes, eventually coming to operate as something of an individual business. In these cases, there is every chance that multiple systems result in duplication — both in terms of the information being produced and the effort required to manage it.

As an example, there is a corporate occu-

pier with a presence in more than 70 countries managing approximately 10,000 leases globally — covering both property and assets. As the company grew, there were conflicting processes being employed to manage a diverse property portfolio. Inefficiencies were also rife as similar, or in some cases identical, tasks were undertaken in different individual countries and regions. For example, the company processed lease payments manually, which took on average one day per month in each country — costing in excess of US$130,000 globally.

The good news from a CRE and FM perspective is that cutting-edge PropTech solutions helped this company to act in a more informed, collaborative and unified way. This result offers a lesson to others in the space. A historically disjointed approach — whether by geography or function — is an obstacle to having a shared corporate vision and meeting common objectives that no organization can afford in today's connected world. The whole company across all business units, individuals and partners, should be pulling towards the same goals and be united in delivering one mission. That is the path to success.

PropTech and Smart Data

Another way to pave the path toward success is with data. Property technology can empower CRE and FM teams across divisions and geographies to use data to gain insights that can enable stronger cooperation with other business units, inform better decisions, streamline processes and demonstrate the positive impact these can have.

The problem is many large corporate occupiers deploy numerous software solutions to manage an array of business processes across finance, human resources (HR), CRE, FM and other functions as a result of siloed operations. Often this is nobody's fault, but simply the function of software being inherited within a disjointed business culture. The reality is in a digital global marketplace, this is an antiquated approach that puts them at a competitive disadvantage. It does not offer the freedom and flexibility to link and integrate property management and CAFM solutions with other technologies as the company grows.

For real estate and facilities management, many companies opt to utilize third-party CRE and FM technology solutions that can address these issues. As with any enterprise technology platform, communication and integration remain critical. Having a PropTech system that is connected across an organization — and can even be integrated with other third-party applications — solves the problem of different departments using different systems, which leads to sub-optimal decision making and lack of data integrity.

Indeed, disparate, incompatible technologies offer no way of creating a single version of the truth. The result is a lack of visibility, which creates blind spots in the decision-making process, as key data points such as maintenance costs, occupancy levels, lease start/end dates, break clauses, rent reviews, rent-free periods and other financial information become limited or unavailable to some teams. Integrated and connected PropTech systems arm companies to take a more unified and linked-up approach — with applications that employ machine learning and AI for lease abstraction, for instance, yielding deeper insights that will enable better business decisions in CRE and FM.

A consequence of employing PropTech to enable greater collaboration across regions and departments is that an organization's way of working becomes proactive rather than reactive. So where once, for example, every time an asset required maintenance, the company would fix it — but there was no method of continual analysis into the performance of that asset, and no modelling of the data to show how replacement of that asset might actually reduce the financial burden in the long term — now integrated CRE and CAFM applications allow corporate occupiers to drill down to underlying insights, employing easy-to-interpret visual presentations and taking action based on the analytics.

To make fast and informed decisions, businesses need to have all the pertinent information to hand in a clear, concise format, and PropTech allows that. And the better connected PropTech is with other solutions — such as IOT, customer relationship management (CRM), enterprise resource planning (ERP), accounts payable and HR applications — the more it unlocks barriers to productive communication and collaboration.

Coping with changing business demands

Using PropTech to unlock the potential of data is more important than ever, as generating a consolidated — and transparent – view of the company is now a fundamental requirement rather than an option.

Indeed, company leaders need real-time visibility of the combined financial position and to report on, for example, future lease payments globally, or the total liability of assets worldwide. Not only is this information crucial for business intelligence but, under new IFRS 16 or ASC 842 accounting standards, there are risks and potential penalties for not accurately disclosing these liabilities on the company balance sheet — with an audit trail to prevent putting the company at risk of not meeting its compliance obligations.

Benefits extend beyond compliance. When recommendations are required from the team by the C-suite for a potential purchase, investment or cost reduction, the team can leverage PropTech to provide the supporting evidence to inform executive decisions. In fact, the absence of collaboration between the CRE department and others would hamper the strategic decision-making process across the business. For example, if they were unable to provide combined data across the property portfolio, FM and finance, when a company wins contracts in a new territory, it would struggle to determine the location of new warehouses.

In addition, the CRE teams put themselves in a position to bring about significant efficiencies and process enhancements for lease management. A collaborative platform — with input from property, FM, finance and other departments — can help to manage a lease under negotiation, produce information relating to the impact of that lease on the balance sheet (in this case under IFRS16) and provide analysis of what would happen to a portfolio if the number of leases either increases or reduces. This is no longer just good business practice — it's required.

Understanding that CRE and FM are not just services, but sources of knowledge and insight

Seeing CRE and FM as more than a support function but as a force within the business to drive strategic initiatives is becoming increasingly important to overall business success. Increasingly, the traditionally isolated position of these divisions is shifting to one of openness to the point where corporate real estate and facilities management are becoming the enabler of collaboration within the overall organization. More than ever, businesses — especially those that occupy physical space — must be agile enough to react to changing market conditions, whether to maximize opportunities or limit the damage of downturns.

More and more, CRE departments are being asked to inform direction and strategy — in some cases even leading decision-making. Occupiers across retail, office, industrial and more are cognizant of accessibility to amenities, the proximity of transport networks, internal fit-out and decoration and other elements that influence not just consumer satisfaction, but also employee satisfaction. Deployment of complete integrated workplace management systems (IWMS) to cover the full spectrum of CRE management, capital projects, FM, the workplace brand, maintenance/asset management and sustainability and energy performance is becoming increasingly more common. The result is property teams who are more pivotal than ever when it comes to collaborating across regions and departments to make better strategic decisions for major corporate occupiers. FMJ

Steven Fox *manages a team of lease and real estate software specialists at MRI Software, a provider of real estate software applications and hosted solutions for occupiers, investors and owners. Tasked with helping corporate organizations manage their global property portfolios, Steven is responsible for the adoption and implementation of PropTech, while also helping to lead MRI's overall CRE strategy. As part of this brief, he is established as a principal voice on the impact of evolving lease accounting standards — primarily how technology can be harnessed to ensure compliance and continued best practice for property and finance departments.*

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CHARGING UP

BY DAN BLADEN

The surge for tech-enabled mobility

A new report published by Chargifi with input from WeWork and other industry experts, suggests companies that take a one-size-fits-all approach to workplace design will miss opportunities to address expectations of a multigenerational workforce. Furthermore, that productivity can be greatly increased by implementing a "tech-enabled mobility" approach to workplace design and culture.

The study polled more than 2,000 employees about their experience in the workplace, including the office design, culture, and how mobility affects their workday and productivity. Industry experts then layered their insights on top of the research.

Workplace mobility gives employees the freedom and infrastructure to work anywhere, from different spaces throughout the office (and beyond) and from any device. However, basic requirements such as access to WiFi and power can limit mobility.

According to PowWowNow's annual flexible working study[1], 81 percent of modern workers today want a job that offers flexible working opportunities.

There are real benefits for employers who adopt a mobile workplace strategy as well, most notably, real estate savings. When assigned desks are only occupied 20 to 40 percent of the time[2], companies that offer mobile working options can maximize the use of space and reduce the significant cost of maintaining pricey office space.

The study and expert insights confirm the implementation of new technology that enables a mobile workforce, such as mass deploying smart wireless charging, has the potential to increase efficiency, employee engagement and ultimately, productivity. While WiFi is now widely available in public and private spaces around the globe, access to power is the next vital connectivity problem to solve. Nothing happens without power.

The first area of the study examined how office mobility and design impacts employee satisfaction and productivity.

Interestingly, the report finds that employee collaboration and sociability, which drives workplace design and has led to the widespread implementation of the "open" office space, fails to consider the current expectations and needs of employees seeking quiet zones and private spaces to think and complete assignments.

Also, 54 percent of employees polled in the study claimed the ability to concentrate on tasks with private spaces to work in is the most enjoyable aspect of the workplace culture and design. Meanwhile, 48 percent said seeking a quiet place to

think was the most enjoyable part of the workday. These requirements seem to go against the modern trends of open plan working, unless concessions are made using design and technology to address and overcome these challenges.

For employers, an open floor plan initially designed to enhance collaboration among colleagues and highlight flat hierarchies, could equate to a loss in productivity. Recent research by Enigma suggests nearly an hour and a half are lost every day[3] due to various disturbances in an open workspace.

"Lack of ability to charge is the third strongest reason why employees are reluctant to move away from dedicated desks..."

The report goes on to uncover some more insights in this area, stating that employees are clearly in need of spaces away from the hustle and bustle of their desks situated in open office floor plans, with 39 percent stating their current office environment does not make that possible. Additionally, more than 27 percent of workers polled said their workspace is not setup to allow them to work away from their dedicated desk.

The study found the youngest employees (those 18-24 years old) most prefer workplace mobility. Having grown up in a time when they have been able to communicate from anywhere, while on the go, it is natural to expect this same mobility in the work environment. Offering options such as hotdesking (employees are not assigned a desk, rather they can use any available desk), shared spaces with social hubs, and private quiet spaces, are much more attractive to millennials than conventional office design with assigned workspaces. Millennials want to be stimulated and excited by the company they work for.

Workplace mobility options must be built on sound technological foundations in order to drive real benefits to employees and employers.

However, the study finds that less than half of employees surveyed said their current office setup allowed them to work away from their desks. Furthermore, 18 percent of workers agreed the current available technology deployed in the workplace hinders their productivity. If an employee is tied to a dedicated desk, a full 20 percent agrees current workplace tech solutions do not meet their needs and expectations for achieving the greatest productivity during the workday.

To facilitate workplace mobility, facility managers and employers must address all connectivity barriers. One of the most important aspects to consider is convenient access to power. Wireless charging, the ability to charge a device when it is placed on a wireless charger, instead of carrying plugs, cords and finding spaces near electrical sockets (generally near the floor), throughout the office space will allow employees to take advantage of workplace mobility.

"Lack of ability to charge is the third strongest reason why employees are reluctant to move away from dedicated desks (68 percent of people have strong to middling concerns)," according to a recent Workplace Mobility study by WeWork.

For employers, wireless charging allows companies to make informed decisions about office space utilization and employee mobility. When integrated with workplace management platforms, smart wireless charging can capture real-time data on employee behavior and space availability/usage, giving insights on which meetings rooms are available, for example, and directing employees towards under-utilized facilities.

Also, powered devices mean continuous access to modern workplace tools and apps, such as Slack, Dropbox, Google Drive, allowing employees to work on the go.

When it comes to leveraging technology in workplace design to increase productivity, a very eye-opening stat emerged, 46 percent of polled employees said it takes them four minutes or longer to setup meeting room technology in order to facilitate meetings in a timely manner, including sharing presentations on screen, finding and plugging in to power outlets and establishing conference calls.

When the number of meetings for most employees during the average workday is taken into consideration, that is a signifi-

cant amount of time wasted. The time wasted setting up meeting rooms has cost the US economy somewhere between US$70 to nearly $300 billion[4]. Losing 5 percent of the workday due to technical issues equates to 21 minutes of lost productivity per day, 1.75 hours per week, or one full working day per month.

Implementing smart technology solutions can introduce efficiencies that reduce time wasted and increase ROI. Smart wireless charging is one technology that can streamline tasks, especially as it connects with other technology and creates triggers. For example, when an employee enters a conference room and places their phone on charging spot it could automatically trigger various tasks to happen simultaneously such as turning on the lights, showing the meeting room as occupied, and initiating conferencing software to begin. As the employee leaves and removes their phone from the wireless charging spot, the room recognizes the meeting has ended and initiates the closing of the apps, lights, system.

Key findings of the study summarized:

- Technology enables workplace mobility
- Designing the workplace for employees seeking quiet spaces and different spaces to work in (workplace mobility) will improve engagement and productivity
- Workplace mobility increases efficiencies in the workday. FMJ

WHAT ACTIONS SHOULD FMS TAKE TO ENSURE THEY ARE KEEPING THE BEST EMPLOYEES ENGAGED IN THE WORKPLACE?

- Audit the current workplace mobility status to find opportunities to provide the experiences employees expect and want. Then work with the IT department to find the latest technology solutions that could create a more mobile, productive workforce.
- Design separate spaces for various tasks throughout the office, creating opportunities for employees to find quiet time to think and complete work, as well as open spaces for teams to collaborate.
- Find and implement technology solutions that will allow employees to work in a more mobile way, for example, smart wireless charging for convenient access to power on the go, or intuitive check-in to cut down on time spent checking in to meeting rooms or hotdesks and facilitating conference calls.

Dan Bladen *is the co-founder and CEO of Chargifi, the wireless charging solution. Chargifi was born as a result of Dan spending six months traveling around the world in 2012. Chargifi's mission is to make wireless power as ubiquitous as WiFi is today. Chargifi, now deployed by over 200 organizations in 21 countries, works with all types of wireless charging technology. Prior to Chargifi, Dan oversaw a team of 50, designing and implementing a network and AV infrastructure for a $8.6 million building project in West London.*

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4. https://blog.lucidmeetings.com/blog/fresh-look-number-effectiveness-cost-meetings-in-us

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MY FACILITY

>>>>>>>>>>>>>> EDGAR MOCTEZUMA

BBVA Stadium
Houston, Texas, USA

On any regular day, IFMA member Edgar Moctezuma manages a facility that offices roughly 25 employees. But on game days, Moctezuma and staff franchise welcome 22,000 fans to BBVA Stadium in downtown Houston.

Opened in 2012, the orange-clad steel stadium is home to the Houston Dynamo of Major League Soccer and the Houston Dash of the National Women's Soccer League. The facility also serves as the home venue for Texas Southern University's football (American) team and hosts international soccer and rugby union matches and concerts.

The stadium was completed for a construction cost of US$95 million, making it the most cost-effective modern soccer-specific stadium. Because the stadium is a LEED Silver facility, Moctezuma's FM crew strives to maintain sustainability efforts while finding new ways to be green.

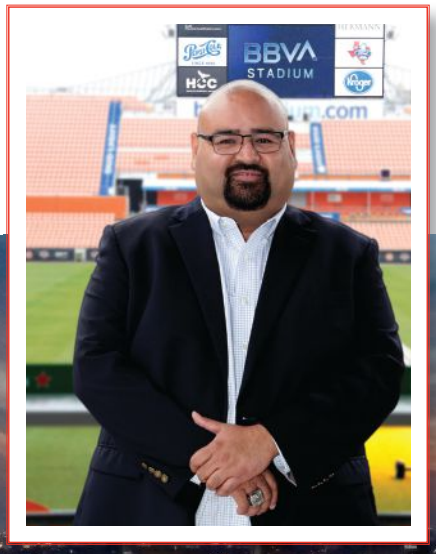


Photo by Yonas Woldetsadik.

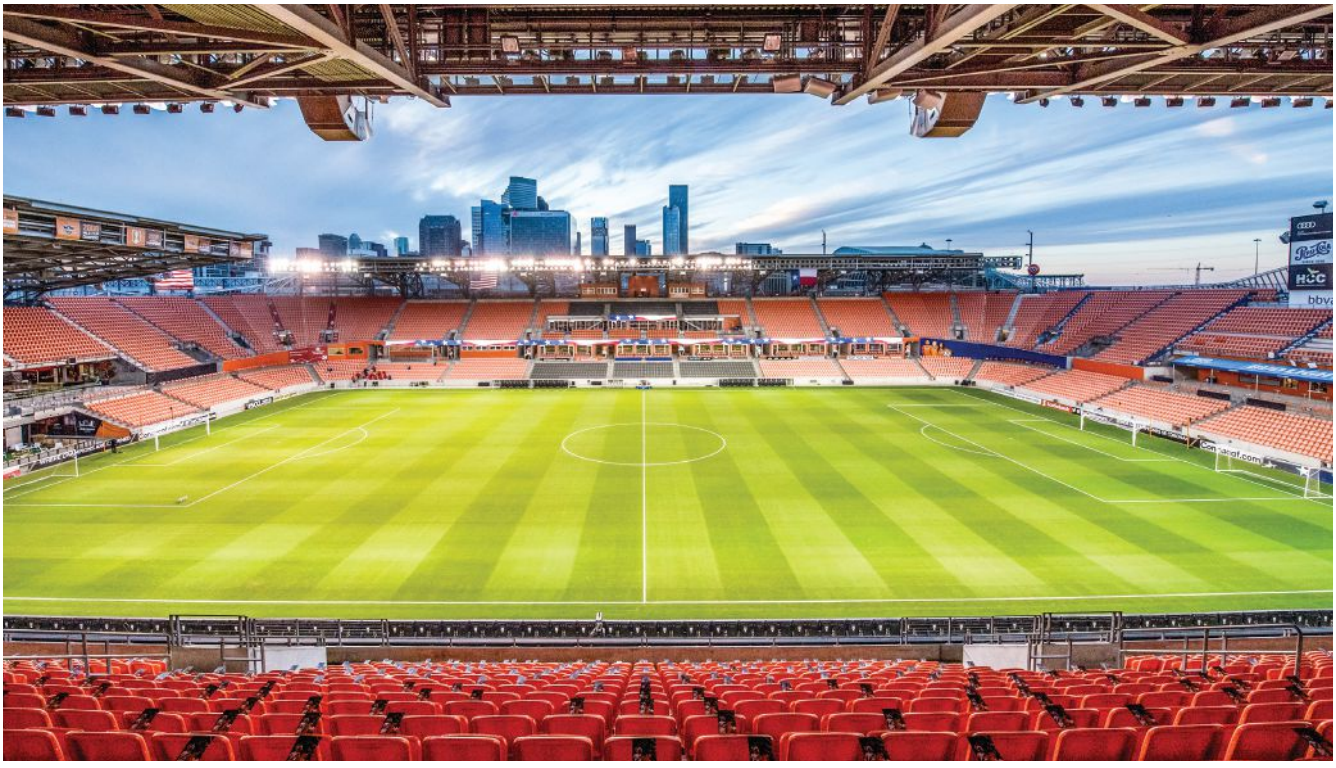
Stadium photos courtesy of the Houston Dynamo.

FMJ: ***How did you get into FM?***

EDGAR MOCTEZUMA: Right out of high school, I didn't know what I wanted to do, but I knew I didn't want to do four years of college. I went to Universal Technical Institute and after graduation was tough. It was hard to get a job and no one really wanted to give an 18-year-old kid a service van full of tools. I finally got a big break at George Bush Intercontinental Airport in Houston as an HVAC technician. I evolved into one the better technicians there. I moved on to a contractor's job and then a position opened at NRG Park in Houston where the Houston Texans play. I got the opportunity and I evolved from HVAC to mechanical, electrical and plumbing. I was promoted into management and was there for seven years.

I got to a point where you work a lot of events and it's pretty much 300 days a year. I felt like I needed a break. I went back to UTI where I took the position as facilities director. That's where I homed in on the overall facilities aspect. I learned more about security, housekeeping, how to get into the budgets and more day-to-day maintenance.

I decided to move back into sports and in 2014, I was hired to be the engineering manager at BBVA Stadium. All that previous experience helped me out. In 2017, I was promoted to director of operations and engineering. I oversee the stadium, day-to-day maintenance, engineering and those sorts of things.



MY FACILITY

>>>>>>>>>>>>>> EDGAR MOCTEZUMA

BBVA Stadium
Houston, Texas, USA

FMJ: ***What's a typical day like at BBVA Stadium?***

MOCTEZUMA: I come in every morning and walk the building. It's only 22,000 seats, but there is always something that can be improved or fixed. We're usually working on a project and communicating with our peers. There are always a lot of moving parts. On a game day, I usually show up six-to-eight hours before gates open. We make sure everything is in place and making everyone has what they need. When we open the gates, we get everyone in and monitor the lines and address any problems as they crop up. When the game starts, we're still working. We take care of security issues, maintenance issues and make sure everyone is having the best possible time.

It's just operations staff at the stadium every day. The rest of the staff offices off site. The challenge is game days when we have another 100 employees descend upon us for their game day operations. They have things related to the game that they must do. We have to find space for them, and space isn't always available. We convert an auxiliary locker room into office space and make other accommodations so that the staff can help make the game happen. Not everyone is concentrated in an office area. We're constantly moving.

We also have two teams. We have the Houston Dynamo who have their team staff that take care of their needs. They have permanent space here. As far as the Houston Dash is concerned, they do not have permanent space, so we convert space for them to operate and for their team and staff to prepare for their games.

For international games, sometimes they have some big-name soccer players that show up. We've had Lionel Messi here. There's a lot of coordination involved like a police escort to get the team from the hotel to the stadium. Sometimes they have their own security team. Sometimes they have special requests like lighting and temperature in the locker room, so we must make those accommodations before they get here.

Texas Southern University football also plays here. For their games, we have to convert the locker rooms, put up goal posts, drop nets and repaint the field and other game preparation. Our field is our pride and joy. We don't want to damage it. If we lay tarps down too early, it can damage the grass. We do more on game day rather than have everything prepared a couple of days in advance. When it comes to the grass, we can't do that. If we cover the grass, it can hurt, so we wait until the last minute as much as we can.

We have an off-site storage building across the street. Storage is an issue here. We are in downtown, so we don't have a lot of real estate. We must be creative and store things where they fit, while keeping everything looking nice. We can't have things laying around or cluttered.

If everything goes right, which it almost always does, there's a great feeling of accomplishment. We have 22,000 fans here and we're responsible for their safety, their security and making sure they have a good time. It can be stressful, but when it's done we breathe a sigh of relief. We take our jobs very seriously and love what we do, and then we get to do it again.

FMJ: ***What makes managing BBVA Stadium unique?***

MOCTEZUMA: We're unique in that we're a soccer facility. The game is growing at a rapid pace in the United States. Being a part of that and the things we do, from the game to the guest experience is special. I get to lead a team of people who want to grow. It's intimate. I've worked in the 70,000-seat stadiums before. There's not a bad seat in the house. We're constantly looking to improve. I feel like it's my home.

FMJ: ***What is the biggest challenge you've faced and how did you fix it?***

MOCTEZUMA: There have been a lot, but when I was promoted to my current position, it was a difficult transition. I went from an engineering manager to the director of operations. I was focused on equipment and the nuts and bolts of things. Suddenly, I had to look at how everything integrates. That's when I decided to look at earning my CFM® with IFMA. I took courses and studied and learned more about what IFMA does. I took my exam and passed. Making the transition has been one of the most challenging parts of what I do, but it's been great and has opened my eyes to a lot of different parts of being an FM.

FMJ: ***You've worked at a campus, a 70,000-seat venue and a 20,000- seat venue what are some of the challenges that are similar across the board?***

MOCTEZUMA: Customer service. You try to do your best, but you won't be able to please everyone. It's hard to please everyone because someone may not agree with how something was handled or something that we are doing.

FMJ: ***What advice would you give to someone just getting started in FM?***

MOCTEZUMA: Learn as much as you can. You can learn something from everybody. Get in the middle of things and be hands on. Find out what people are going through. Your people are important. Get involved in what they do and be open minded.

FMJ: ***Why have you stayed in FM?***

MOCTEZUMA: I really enjoy it. It's a challenge every day and you're a part of something bigger than yourself. You make things happen and people come to you to solve problems. If you're lucky and blessed enough to build a good team, it makes it very enjoyable. You come here and you make things happen. I would rather do nothing else. It doesn't feel like work.

FMJ: ***What do you like best about what you do?***

MOCTEZUMA: It's not a job. It's a place where I come with my friends and we make things happen. We know we can overcome any challenge. We can create anything. We do that because we have. It's a wonderful feeling to come in accomplish that. FMJ

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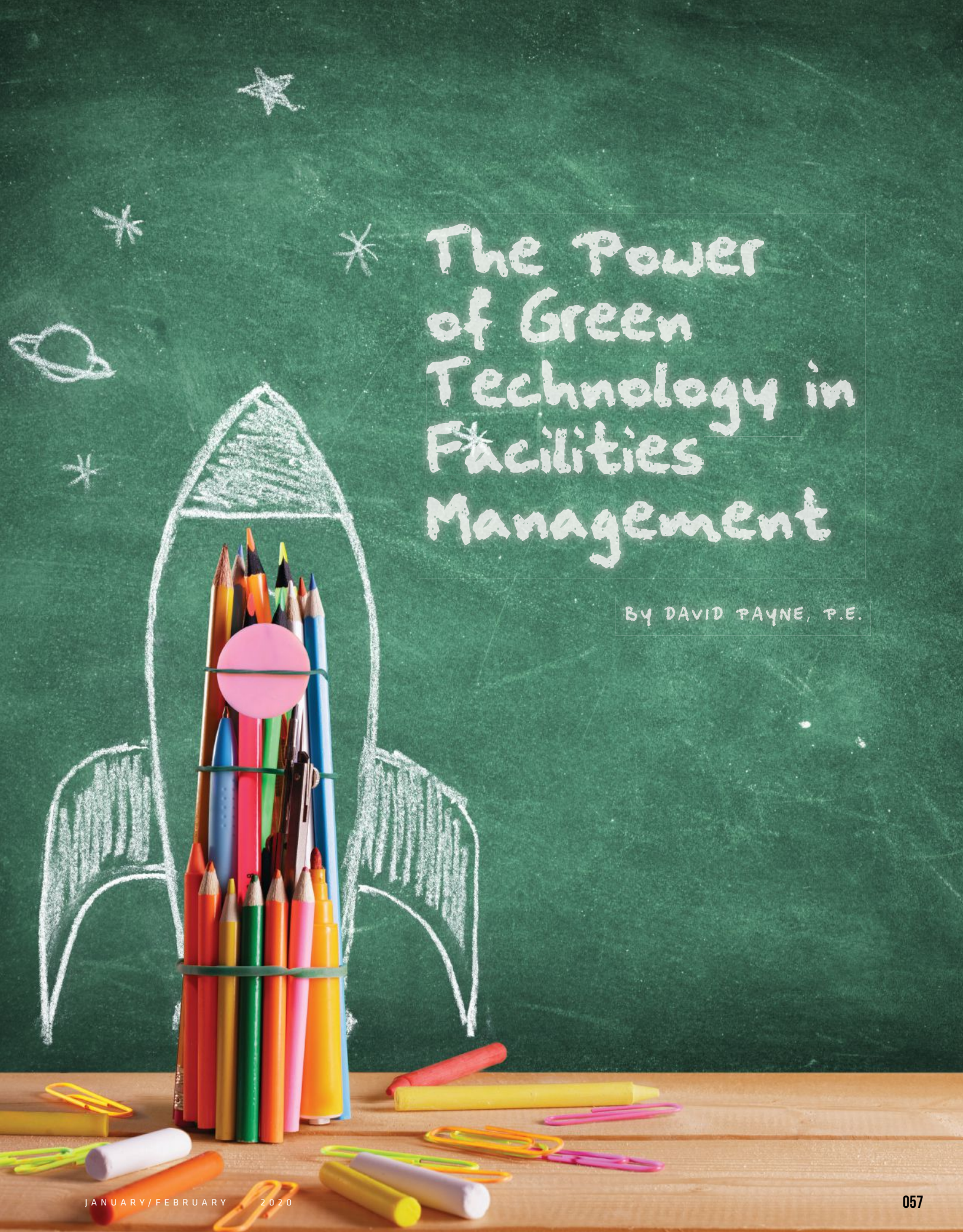

The Power of Green Technology in Facilities Management

By David Payne, P.E.

During the late August summer days, students in Jasper County, South Carolina, USA, start getting ready for their first day of school. The sultry heat makes back-to-school journeys a bit difficult, and the heat stresses classrooms.

Previously, those humid classrooms could make class uncomfortable without high functioning HVAC systems.

But this year, students have a new classroom environment. Thanks to recent facilities renovations across Jasper County School District, the students enjoyed their first day of school in classrooms filled with cool air and new lighting fixtures, all of which optimize classroom environments by leveraging new green technologies.

Once primarily reserved for properties like hospitals and larger buildings, smart technology is now reaching facilities of all sizes, particularly in educational centers across the globe. As seen in Jasper, smart technologies create healthier learning environments, long-term financial savings, and better overall facilities programs. Institutions that choose to utilize smart technology save nearly US$100,000 per year in utility costs, according to a report by Capital E.

Along with implementing smart technologies in facilities, companies that provide facilities and grounds management for schools and universities, have adopted new green commitments (notably reducing carbon emissions by 33 percent by 2024) due to the multitude of benefits – lower long-term costs, sustainable output and improving learning environments.

Implementing green technology in facilities programs is no longer a "nice-to-have." Green initiatives are now a must in maintaining a facilities program built to last.

To stay ahead of the curve, the FM industry must understand today's prevailing green technology trends, those trends' impact and what is next for green technology.

Today's Top Green Technology Trends

Many K-12 and college institutions believe adopting green technology will be more of a financial burden than a long-term solution. Although the upfront cost may be difficult to manage, many green technologies help save overall operating costs in the long-term. For example, Jasper County School District projects to save on average $280,000 per year.

It is important for the facilities industry to become better aware of the top green technologies deployed today.

Internet of Things (IOT) technology & CO_2 Monitoring

As IOT technology continues to rapidly expand, the cost of implementing the technologies lowers and can more easily be integrated into other systems. Carbon dioxide monitoring in the classroom was uncommon years ago, but as the technology has advanced, the cost of systems dropped and sharing of the data with the HVAC control systems is more standardized. Today, it is becoming more common to see the installation of these systems in the classroom and lecture halls of many educational facilities.

A Lawrence Berkeley National Laboratory CO2 Study found that moderately high indoor concentrations of CO2 can

> "significantly impair people's decision-making performance."

The report indicated these results were unexpected and may

> "have significant implications for schools and other spaces with high occupant density."

In addition to ensuring a better classroom learning environment for the students, data from the CO2 system can be used by the HVAC and/or building automation system to operate in a more precise manner. Many HVAC schedules operate on pre-programmed occupancy schedules that are often altered and rarely updated. This often may cause the HVAC to cool hot outside air when unnecessary, leading to high system operation and increased utility rates.

Integrating a CO2 system with the HVAC controls allows for a more precise operation while maintaining the integrity of the classroom air environment.

Below are popular and cost-effective green technologies K-12 and higher education institutions are implementing in facilities programs across the US:

Drones

Drones have become a popular product in the FM space to access areas difficult for humans to reach and troubleshoot malfunctions and help diagnose solutions.

Particularly, the technology's ability to identify hazards or issues located in areas such as rooftops or chimneys proves invaluable. Along with better visibility and access, drone adoption improves worker safety conditions by decreasing the need to venture to dangerous areas and limiting the need to purchase or rent expensive lift equipment.

Electric Lawn Mowers

Available as cordless or battery-powered variants, electric lawnmowers are a highly demanded product. These electric tools are easy to operate and maintain since they are lighter and do not require as many tune-ups when compared to typical petrol mowers. Along with being more sustainable and operating fuel-free, electric mowers also produce less noise at an average of 75 decibels - making them more desirable for educational and enterprise institutions seeking to keep the noise down while improving the environment and saving budget on fuel.

Robotic Lawn Mowers

Robotic lawnmowers, or autonomous mowers, are designed to cut grass without the need for human interaction. Robots receive plenty of attention in today's media and pop culture, and it is only a matter of time before the technology goes mainstream for facilities.

These smart devices are programmable to operate at any time, making them optimal devices to leverage when available staff is limited. The smart mowers also significantly reduce the time needed to maintain large facilities, saving on average two to four hours per job.

Wireless Thermostats

HVAC systems consume the most energy in buildings and are the leading cause of spiking utility bills each month. Implementing wireless thermostats, which allow users to better manage temperature controls from smart devices, such as laptops or smartphones, is one effective way for facilities to reduce energy costs. Jasper County School District is a great example of this.

Additionally, wireless thermostats can collect diagnostic data, giving professionals informed data that can provide actionable insights to better maintain facilities. With this smart thermostat, it is possible to diagnose which room needs air conditioning, preventing the HVAC to work overtime cooling the entire facility where it is only needed in one specific area.

LED Lighting

Similar to HVAC systems, lighting is a major factor that contributes to high energy bills. One solution is LED, or light-emitting diode, bulbs. While LED units may be costly initially, the units utilize 75 percent less energy and last 20 times longer when compared to traditional light bulbs. Along with reduced energy usage and better durability, implementing LED units also decreases the amount of maintenance needed for continued functionality while significantly reducing a facility's carbon footprint.

While it is true these types of technologies can be costly at the beginning, adopting these green technologies will ultimately lead to better financial savings and improved environmental impact.

The Impact of Going Green

Real-world examples of facilities that have already implemented green solutions help understand how to execute a green facilities program. A recent example of how green technology can benefit an institution can be seen through Jasper County School District's recent facilities renovation project.

CASE STUDY: JASPER COUNTY SCHOOL DISTRICT'S FACILITIES UPGRADE

Jasper County School District is a rural school district located in Jasper County, South Carolina, USA, comprised of six schools spanning elementary to high school grade levels.

Contending with aging facility infrastructure, JCSD recognized the need for facility retrofitting and facilities equipment improvements. JCSD committed to an US$8.5 million investment to upgrade its facilities, which included HVAC, solar panels and general energy system upgrades.

Beginning in the summer of 2019, JCSD's new project replaced nearly all its rooftop HVAC systems with new, state-of-the-art units designed for improved air quality to combat mold and reduce CO2 impact. Alongside better HVAC systems, JCSD upgraded all indoor lighting to LED units, with corrected indoor lighting temperatures for optimized learning environments. The district also implemented brighter, directional exterior lighting for improved safety while remaining dark-sky compliant, ultimately reducing overall light pollution.

Along with major upgrades to the district's HVAC and lighting systems, JCSD also implemented additional facilities improvements. The district installed smart thermostat controls to allow for temperature scheduling efficiencies in order to reduce costs and maintain optimal learning environments, while also installing a solar array for more green energy productions.

Water efficiency upgrades were made as well, which included reduced flow faucets, toilets and urinals, all of which led to better district savings on utility costs.

The project is slated for completion in late 2020, and projects to save the district and taxpayers more than US$250,000 in ongoing annual utility costs.

The upgrades will also improve the district's energy use intensity (EUI) ranking from 67th to 19th place among all school districts in South Carolina.

While not all companies or institutions have the funds to invest in facilities upgrades like JCSD, many governments have grants and other types of investment systems available to help fund these initiatives. With low-interest rates and multiple funding sources, such as Guaranteed Energy Service Contracts, much of the capital-intensive energy projects can pay for themselves in a short period of time if facilities managers can smartly leverage available resources.

Why Green Technology Matters

Why is adopting green technology more prevalent now than ever before? According to the Nature Climate Change, global CO2 emissions are on track to increase exponentially for the first time in years due to increased fossil-fuel burning. Given most facilities companies use gas-powered equipment that produces large amounts of carbon emissions, green-focused solutions need to be implemented to combat this global challenge.

While worldwide efforts are helping reduce carbon emissions, there are still harmful facilities practices in place that continue to leave a negative environmental impact.

An example of a harmful facilities practice is deferred maintenance, or the act of failing to address maintenance activities until adequate funds, timing or other resources are available. While this "run to fail" is understandable in context, often this method costs facilities programs more when compared to routine maintenance.

Although every facilities management professional knows to avoid practicing deferred maintenance, these same professionals are strapped to allocating their crews' time and budget toward vital infrastructure systems (i.e HVAC units) and machinery that require frequent attention and care.

However, there are solutions. Green technology will be a key part of FM's future. These technologies provide facilities an opportunity to succeed immediately and for the long-term. The potential is limitless--cost reductions, improved efficiencies, and a healthier environment.

It is due time for the facility industry to embrace a greener future. FMJ

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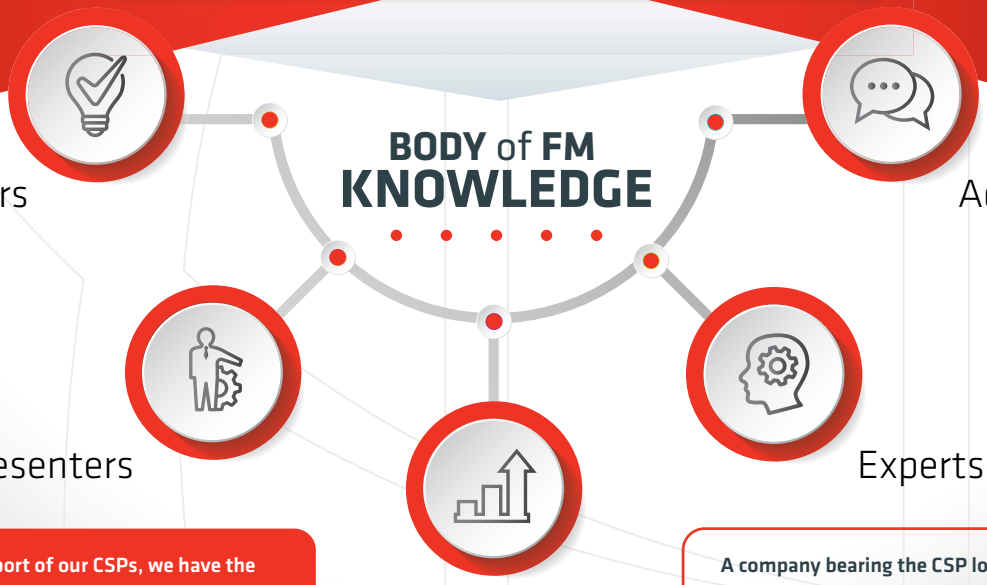

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IoT is Ready *for* Its CRE Close Up

BY **TERRENCE DEFRANCO**

IoT has made steady advances into commercial real estate sector for years and this technology is evolving quickly. Lighting and energy demand response controls are proliferating for commercial facilities, adding even more value to building environments, workplace experience and energy efficiency goals.

The trend today is more modern, livable workspaces; smart buildings make it possible to enhance the human experience and cut costs at the same time.

While enhancing building sustainability through LEED Certification is an admirable goal for building stewardship, a newer, emerging global standard for the modern workplace, WELL Building Standard™, is poised to raise the bar.

The International WELL Building Institute (IWBI) is leading a global movement to transform buildings and communities to help people thrive. IWBI's WELL Building Standard is a leading global rating system and the first to be focused exclusively on the ways that buildings, and everything in them, can improve the occupant's comfort, drive better choices, and enhance health and wellness. The WELL v2™ pilot is a newly launched version of the WELL Building Standard, and the WELL Community Standard™ pilot is a district scale rating system that sets a new global benchmark for healthy communities.

Focused on enhancing the comfort and improving the health and wellness of its occupants, Well Building Standard relies heavily on IoT for sensors and communication hardware to remotely monitor the quality of a building's environment — air, water, light and noise.

Whether or not a commercial building manager participates in the WELL Building Standard, those that are considering investing in smart technology for their facility are in good company. Recent research shows that the global smart building market is expected to grow from an estimated US$7.42 billion in 2017 to nearly US$32 billion by 2022[1]. And a recent survey of 20 countries found that 57 percent of US organizations and 59 percent of global organizations plan to increase their investments in smart building measures related to energy efficiency this year[2].

How does building optimization translate to real-world results? Benefits of smart building IoT technology include:

Cost-Savings

Keeping building operations costs in check is a challenge for every facilities manager. While spending on new technology might seem counterintuitive to saving money, cost savings will be actualized over the long term.

Power-hungry machinery, inefficient lights and equipment, and proper time of use can all be addressed — if the FM is vigilant about real time energy usage. A building enabled with technology provides granular data regarding every pump, motor, compressor, boiler, light, etc., so that it is possible to see where a building's energy usage is concentrated. With greater visibility into operations and equipment, it is possible to pinpoint inefficient pieces of equipment or wasteful usage patterns and make deliberate improvements to reduce energy consumption and costs overall.

Wouldn't it be time efficient to fix things before they break? The data gathered from smart building technology can help predict when something's going to fail. Predictive maintenance provides a way to avoid an expensive emergency technician visit and the costs associated with downtime.

Utility companies charge more for power at certain times of the day than others — usually the times when everyone else is also demanding it. Knowing the energy usage of all equipment at all times throughout the day can help FMs plan ahead to avoid those high-demand times and charges. Smart building technology can help with that, enabling the FM to shift the power demand in their favor, and reducing the energy bill dramatically.

Happier and More Productive Tenants

Smart building benefits are not limited to cost savings; they also extend to people. Optimizing the human experience is important for attracting and retaining tenants and can boost productivity and satisfaction among employees. Here's how:

Studies have shown that, as air quality goes down, so does productivity[3]. Smart buildings offer the ability to track indoor air quality — CO2, dust particles, volatile organic compounds, humidity level and more — and make improvements toward healthier working and living. Lost productivity is expensive — another study showed that, from 2000 to 2008, improvements in air quality nationwide are estimated to have saved manufacturers US $20 billion annually from productivity loss[4].

A 2012 study found that only about 40 percent of US workers were satisfied with their office temperatures[5]; design standards call for a rate closer to 80 percent. Another study shows 53 percent of employees say they're less productive when the office is cold[6]. The trend today is more modern, livable workspaces; smart buildings make it possible to enhance the human experience and cut costs at the same time.

Enhanced Sustainability

Optimizing energy and resource use is a concern faced by many facilities managers, who are sometimes tasked with meeting certain objectives related to sustainability. Four in five U.S. firms are currently putting sustainability strategies in place for a variety of reasons, ranging from revenue growth to cutting costs to keeping pace with competitors. One firm's efforts to reduce its environmental impact and improve efficiency reduced its annual operating costs by US$1.5 million. Technology makes it possible for buildings to operate at optimum energy levels and reduce their carbon footprint—making them both smart and sustainable.

Increase Building's Competitive Edge

Thanks to smart building benefits, CRE value is now about more than just location. The presence of smart technology is also becoming a market differentiator. Not only are prospective buyers interested in the bottom-line benefits connected to energy use and maintenance, but also in the ways data allows them to connect with their tenants and strengthen tenant engagement. Technology also makes potential problems and issues easier to identify, diagnose and manage — another plus.

The trend today is more modern, livable workspaces; smart buildings make it possible to enhance the human experience and cut costs at the same time.

TOP WAYS FACILITY MANAGERS SAVE MONEY

MAKE THE LEAP TO LED

Even though the number of LED installations is steadily increasing, adoption is still at only 12.6 percent. But it's an excellent way to lower the facility's electric bill: On average, LED lights use at least 75 percent less energy than incandescent lighting and, according to Energy Manager Today, have the potential to produce a lifetime return on investment of 411 percent for the average office building[7]. And they are available for all types of fixtures, including shop lights, office light panels and more. Switching out old bulbs for LEDs can save cut electric bills in half and should be at the top of the list for facilities management cost saving initiatives.

To maximize savings in lighting, it is also recommended to install a lighting control system to automatically adjust lighting levels. These types of lighting systems allow complete control and automation of your lighting based on set schedules, occupancy sensors, vacancy sensors, natural light sensors, and dimming control, and are available for both new construction and retrofit applications.

SEAL THE AIR DUCTS

Air ducts distribute air from the HVAC equipment to various areas inside the building. Ducts experience stress and pressure that can cause wear and tear over time, causing air to leak from the system. Sealing and insulating ducts properly can help reduce up to 20 percent of a cooling system's energy consumption.

UTILIZE VARIABLE FREQUENCY DRIVES ON EQUIPMENT

A motor running at partial speed is more energy efficient than one running at full speed; that means significant savings can be had simply by operating those motors more efficiently. One way to do that is with the use of a variable frequency drive, a type of motor controller that varies the frequency and voltage supplied to an electric motor. VFDs can be used to control the speed of HVAC blower fans, pumps, compressors or anything else. Fans and pumps often operate at partial load; a VFD can change the speed or torque of the motor to control the output of the system, resulting in increased efficiency and energy savings.

COST CUTTING

One way to reduce costs is to send multiple facilities services out to bid each year. Economies of scale can be achieved to secure optimal prices on electrical, mechanical, maintenance and more.

Comparing energy rates can produce facilities management cost savings. In areas where it is possible to choose among a variety of energy providers, it is important to compare different providers' plans, rates, and special conditions. The more research done, the better the chances of closing an affordable and stable deal provides a predictable budget, protecting you from volatility and unexpected expenses.

In some areas, utility companies offer demand response programs, which involves turning off the electricity or lowering the load at peak utility usage times to take advantage of a better rate.

GET A BASELINE OF CURRENT ENERGY CONSUMPTION

Before doing any of the above, it's wise to establish a baseline of the building's current energy performance and consumption[8]. Doing so will help better understand the building's energy use and provide a point of reference to evaluate the impact of future energy-saving efforts.

Today's property managers need to be able to react quickly to issues, which is why it is important to have connected devices like water and electrical sensors which can automatically alert the manager when there's a problem. Intelligent building solutions first arrived in the commercial real estate market as tools to improve specific facility systems such as physical security, HVAC and lighting, which began connecting devices and then collecting and analyzing data.

Continually improving intelligent building technologies dramatically enhances the operations of equipment and provides energy efficiency. The data collected from IoT devices has become a distinguishing factor when it comes to attracting new tenants and keeping legacy tenants' content. IoT empowers building owners with information about foot-traffic, occupancy rates and tenant and visitor flow, which can be used to market the properties to prospective tenants and better compete in the marketplace. FMJ

Terrence DeFranco *is CEO and President of Iota Communications, Inc. His background is primarily in the area of corporate finance, management and capital raising. He has been an active principal investor, senior manager and advisor to many early-stage companies and has extensive experience in dealing with issues related to the management, finance, operations and corporate development of startup and middle market public and private companies. He can be reached at tmdefranco@iotacommunications.com.*

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DATA INTEGRATION: Building a Digital Ecosystem for FM Success

BY LISA STANLEY

Advancements in technology are moving at a significant pace, and **impacting virtually every aspect of life,** from the buildings where people live or work, to the way people communicate with each other, and much more. There are new challenges including data integration – how to effectively use the information available from a variety of sources that do not communicate with each other to achieve better outcomes. **Finding the right balance between investing in traditional business intelligence and more advanced analytics,** while exploring and investing in emerging technologies is also challenging and **requires a greater tolerance for risk** from the top of the organization down.

There is no magic potion, or one-size-fits-all approach to create a unified vision for FM. The answer lies in building a digital ecosystem that harnesses information from a variety of sources and disparate systems in a way that addresses the needs of an organization and available resources.

At a World Workplace session in October 2019, the panel I moderated included Phil Wales, Ebusiness Strategies, Melissa Morgan from Morgan Consulting and Shane Gamboa from Chevron, where we discussed how FMs can build a digital ecosystem in their organization and how to get started.

What is a digital ecosystem?

It's an information-enabled network of collaborative internal and external business partners who use technology to connect strategies, business functions, competencies and actions that cultivate innovation and lead to better business outcomes. Simply put, it's about connecting people with technology in a new way that improves results.

The digital ecosystem provides the framework for how FMs move forward in the digital world. Constructing the ecosystem requires a variety of perspectives from inside the organization and from business partners. To be effective, it mandates collaboration between IT and the business units on integrating and aggregating data. Collaboration of this sort has not been present on a broad scale in FM, and is critical to evaluate and confirm where investments should be made, including in the IT infrastructure and the building. It runs through the entire asset life cycle, starting with the planning process including answering the question, “What problem are we trying to solve?” The process then addresses decision making to acquire the asset, provide for operations and maintenance, and retirement or replacement.

How to get started with data aggregation and data integration.

Taking these steps will provide needed structure to the process, and encourage active engagement from decision makers and influencers in managing the change needed for this quantum step. Here's how this process can be applied to FM.

1. Clarify and prioritize information required to efficiently run the business.

This is where collaboration between IT and the business becomes a powerful tool, and gains support for an anticipated improved outcome. Take the time to thoroughly vet the shared insights and determine priorities for moving forward and ensure that collaboration continues every step of the way. Make a list of every relevant aspect of the building that is currently addressed in your FM world, as well as those you would like to capture, then prioritize them.

2. Assess current data condition.

This can be a painful step that requires a frank assessment of the current state of your data for accuracy and whether it provides a complete picture of what you need to achieve optimum performance of the workplace and workforce. Some things haven't changed as technology has evolved — garbage in still yields garbage out. Develop a program to "fix" current in-place data and information, recognizing it will likely take longer than you think it will, and expose some surprising insights to the data — gaps, errors and more. What information is collected through badge swiping throughout the facility, and is it common practice for individuals to "share" badges for convenience sake? New privacy laws have been passed in several US states, joining GDPR in the European Union to provide additional protection for personal information. Outsourcing this function does not relieve an organization of the responsibility and may require more safeguards if this information is being stored in the cloud.

3. Identify and clarify inefficiencies in the data supply chain.

This includes information from various repositories internally, from vendors/suppliers, movement processes, data governance, etc. Develop a program to address improving data going forward incrementally with a concentration on the issues that can provide big impact and maybe even a quick win to encourage support of the initiative at all levels of the organization. This step shouldn't involve blame, but instead concentrate on the benefits to be gained internally and an enhanced competitive position. Data analysts, programmers, compliance specialists and facilities managers can use their diverse perspectives to improve data accuracy, efficiency, and access and perform a highly effective cost versus value approach.

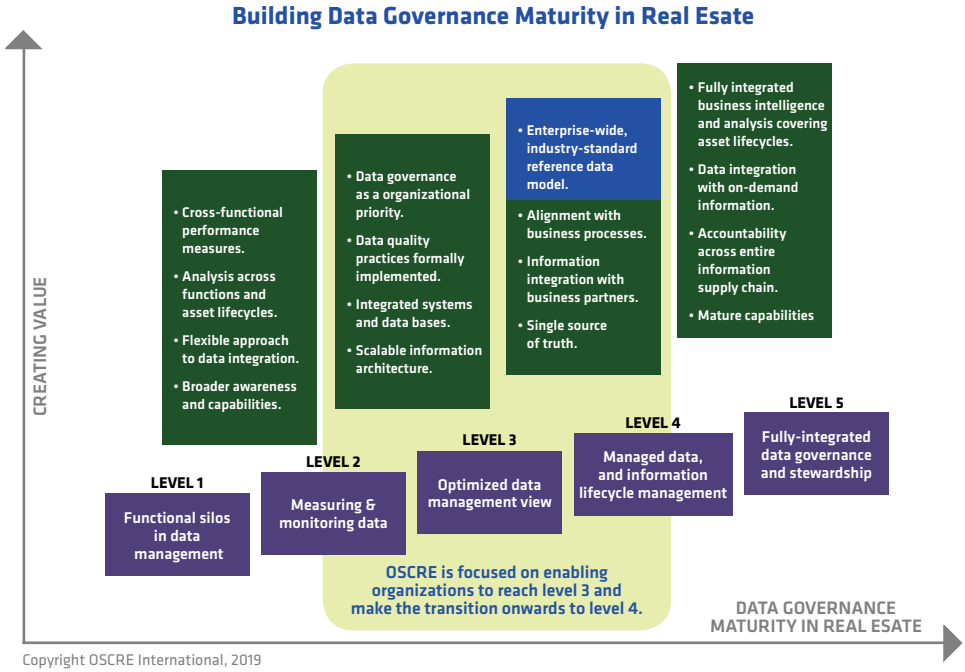
Mergers and acquisitions activity provide an even bigger opportunity to look at the now larger group of disparate systems, analyze them and identify economies of scale. These savings can be derived by reducing the number of disparate platforms collecting data, selecting new ones going forward that can address sensor data on space management, schedules for planned maintenance based on past performance in HVAC systems and much more.

4. Think through the roadmap for the digital future.

How will the accessibility and accuracy of data change the way the business operates? The roadmap to the digital future charts a course that considers the will to effect change in FM systems, and building the skills to execute the plan. What types of skills are needed in the new digital environment? Skills in data governance and digital competency are critical to success in moving forward, and are available in online training and live learning labs. FMs have a unique opportunity to become corporate strategic partners within the organization as the critical link between workplace and workforce data. It may be the catalyst for gaining what has often been the elusive "seat at the corporate table."

As the roadmap is built for the digital future, assessing the organization's data governance maturity level is a necessary step. Level One on the Data Governance Maturity Assessment starts with siloed data and advances to Level Two with analysis across functions and asset lifecycles, taking a more flexible approach to data integration. As shown in advancement in data governance, maturity is a deliberate approach with associated improvement and identified benchmarks. Many FM organizations are hovering between Levels One and Two, with significant progress and improved performance attained in Levels Three and Four. Level Five represents fully integrated data governance and data stewardship, and responsibility for this achievement lies in every part of the organization.

Implementing the technology may not be the most difficult step — it may be building trust in the data.



5. Evaluate opportunities to leverage new and emerging technologies.

The time to "wait and see what happens" with emerging technologies like AI, machine learning and distributed digital ledgers has passed. FMs should take the time to build their understanding of these technologies and others to help frame the questions on how these technologies can advance the FM team and the organization to facilitate integration and aggregation efforts.

GARTNER'S 2018-2019 COMMUNICATION INSIGHT REPORT

found:

- **66%** of CEOs expect their company to change its business model in the next three years
- **87%** of senior business leaders said "digitization is a top priority"
- The **No. 1 barrier** to agile transformations is company culture

FMs should consider formal training in change management to help advance their career. Being able to effectively communicate with the team as to why the change is necessary and why they should care is critical for success. Don't underestimate the value of the influencers on the team and elsewhere within the organization.

FMS SHOULD ASK THE FOLLOWING QUESTIONS:

- What roles do various types of facility solutions (IWMS, ERP and point solutions) play in the current digital ecosystem?
- What role should they play in the future?
- How do FMs assess and access the benefits that are under-utilized in software?

DATA INTEGRATION CAN ALSO BE UTILIZED TO IMPROVE:

Space classification ▶ typically reducing the number of space classifications needed

Space management ▶ more effectively tracking occupancy and utilization

Smarter building applications ▶ sensor data, energy efficiency

Improving technology applications ▶ and their interoperability

Service order tracking ▶

- Planned maintenance
- Reactive repairs
- Move orders
- And more

What are some FM challenges that can be addressed by data integration?

Asset life cycle management starts with the planning process then advances to decision making to acquire the asset, oversee operations and maintenance, and retirement or replacement. Data integration pulls information from a variety of sources to make FMs better stewards of the asset life cycle management process with a more holistic and fact-based approach to decision making.

Start with a small pilot project — no need to make it expansive. Pick an area of operations where those outside the project team can readily connect the dots for results and expand implementation for further projects. Activate a diverse project team to ensure broad perspective and experience that can adjust quickly if needed during the pilot. Evaluation should be ongoing during the project and share lessons learned with relevant stakeholders beyond the project team.

With the advancement of emerging technologies and their ability to improve decision making, FMs cannot afford to be a reluctant bystander, waiting to see what happens. Professional FM opportunities depend on the willingness to expand the understanding of what it takes to build a digital ecosystem, to encourage collaboration on pilot projects and to build the skills needed for your digital future. Are FMs ready?

Lisa Stanley, *OSCRE's CEO, drives strategy and innovation for the organization, working to expand understanding and implementation of real estate data standards, effective data governance and emerging technologies with a variety of constituents in the real estate industry. She has more than 20 years of industry experience and is committed to constructive and innovative collaboration to address the impact emerging technologies will have on the information that drives the real estate industry. She can be reached at lisa.stanley@oscre.org.*

COMPANY NAME Aramark
EXPERTISE FM Consultants/Services/Providers
CSP LEVEL Silver
CSP SINCE 2002
WEBSITE www.workplaceinsights.aramark.com

FMJ What research is your company working on that will help facility managers be more successful in their roles?

ARAMARK The global market for outsourced FM services is projected to exceed US$2 trillion by 2025 with more than 500 billion devices connected to the internet by 2030. Such exponential growth demands a forward-looking approach to integrated facilities management to ensure facilities managers and building owners adapt to the fast-paced changes shaping the FM landscape.

Aramark published a **20 FM Trends for 2020 Report** (https://workplaceinsights.aramark.com/facilities-management-trends) identifying the top issues impacting the industry. Included in our research are discussions on IoT, robotics, space management, asset monetization, employee well-being, among many others. FMs knowledgeable on industry trends bring great value to their organizations.

FMJ What's on the horizon in your field/industry, and how is your company meeting those challenges and opportunities?

A First, attracting and retaining top talent in the United States has never been more difficult. The voluntary quit rate is at an all-time high, and 67 percent of U.S. employees are disengaged. The skilled labor shortage will remain a challenge for building owners.

Additionally, creating the ideal workplace environment and user experience has become a business goal in nearly every industry. FMs must deliver a user experience that drives productivity, employee satisfaction, and retention. Success elements include technology, services, amenities, and a workplace experience that leads to employee satisfaction.

Aramark continuously researches and tests new products, technologies, and approaches that deliver solutions to these workplace challenges. We co-create with dozens of industry partners to identify operational problems, test and pilot solutions, and then deploy them for success. Several commercially available products in today's market have their genesis at Aramark.

Finally, FMs and owners will require greater insight into the cost and performance of their entire building portfolio. Only with the proper data and visibility into an entire operation can strategic decisions be made and with confidence. Aramark has developed a service delivery model and analytics platform that allows clients with multiple facilities over a broad geography to receive faster and better service, as well as gain deeper insight into the overall performance of their portfolio.

COMPANY NAME Connectrac
EXPERTISE FM Electrical/Wire Management
CSP LEVEL Silver
CSP SINCE 2014
WEBSITE www.connectrac.com

FMJ What research or product innovations is your company currently working on that will help FMs be more successful in their roles?

CONNECTRAC FMs are tasked weekly to do the miraculous like provide more power and cable management into a space overnight so that the room can be re-utilized. For 15 years Connectrac® has helped by offering a non-disruptive floor mounted wireway that provides flexibility for current and future needs.

Behind closed doors, their product development team has been quietly creating a product line that will dramatically enhance their easy-to-use system by including more flexibility, more options for a space - more quick changes and more happy FMs. The FM dream of making a space flexible and changeable no matter the request right around the corner. Check out Connectrac Flex® for yourself at IFMA Facility Fusion booth #200.

FMJ Tell us about your CSR efforts or projects. How have these contributed to the community?

C Connectrac began as a dream of one person to change the world, not just with an innovative product but with a passion to care for each other and their community. The HQ workspace is incredibly different and unique where employees can get free back massages or lunches or a listening ear in a hostile free environment. Successes are celebrated and failures are chances to support those struggling. Individuals are given time off to support their causes and communities.

The Connectrac team also comes together to clean the Trinity River banks in Dallas, Texas, USA, support new food sources in the poorest communities of Dallas and participate in rescuing neglected pets one favorite at a time. The HQ lobby features some of the best dog portraits anywhere and if you are lucky during your visit, you will be greeted by a happy wagging tail. Customer social responsibility isn't lip service but a critical core value of everyone at Connectrac.

New Pig

COMPANY NAME New Pig
EXPERTISE FM Counsultants/Services/Providers
CSP LEVEL Silver
CSP SINCE 2017
WEBSITE www.newpig.com

FMJ What research or product innovations is your company currently working on that will help FMs be more successful in their roles?

NEW PIG Our customer base includes tens of thousands of FMs who have a hard job and face similar challenges. One of the most frequently cited pain areas is roof leaks. Every facility has a roof, and at some point they will all leak. Making repairs can take a long time and be very costly. For the period of time until the roof is fixed, New Pig developed some new products specifically to help FMs deal with the unwanted water from those leaks. Our new Pig® Water Absorbent Mat Pad was designed and engineered to pull in large volumes of water on contact with superfast wicking to quickly soak up puddles to prevent damage and injuries. It can be wrung and re-used multiple times during a single water clean-up event, then disposed of. Wringable mats mean less hassle, less waste and more savings. It's the best mat to have on hand when storms or wet weather intrude into your facility from roof leaks, through open windows, porous footers, cracked foundations, or seepage under doors. Also, the Pig® Roof Leak Diverters can be hung from the ceiling directly below leaks to catch and divert water before it reaches the floor.

FMJ What's on the horizon in your field/industry, and how is your company meeting those challenges and opportunities?

NP Climate change is the macro trend that all FMs should be thinking about. Regardless of the cause, there is no doubt that weather events are becoming more frequent and more severe. If you manage a facility, you need to be prepared. That means doing everything you can to seal the envelope of buildings, but also accept that water will eventually find its way inside. When it does, it will damage the facility foundations, infrastructure, and the contents inside. It can also disrupt operations. Water also creates slippery conditions that could lead to slip and fall accidents. Get Ready, don't wait. New Pig created another new series of products to help FMs deal with the change in weather patterns with the Pig® Absorb-&-Lock Strips and Pads. These are infused with super absorbent polymers and are able to absorb enormous amounts of water and then lock it into the pads so there is no leaking or dripping from the saturated pads. They are powerful tools an FM should have on hand before the next storm hits.

KASTLE SYSTEMS

COMPANY NAME Kastle Systems
EXPERTISE FM Security
CSP LEVEL Silver
CSP SINCE 2017
WEBSITE security.kastle.com

FMJ What research or product innovations is your company currently working on that will help FMs be more successful in their roles?

KASTLE We continue developing security systems that empower Facility or HR managers to synchronize their authoritative source database of employee identity information with the physical access control system to make it fast and simple to instantly enroll new employees with access rights and deactivate departing staff immediately.

With our cloud-based access control systems and open-standards interface we can provide FMs interoperability of our credential across diverse hardware and software ecosystems so that a single staff credential could grant access across multi-location enterprise organizations, making it easier to for employees to travel, and for managers to track their credential usage — and immediately deactivate access right if necessary.

We are also refining smartphone-based mobile credentials that provide convenient hands-free access to facility staff on a device they already carry all the time. This platform also offers the opportunity for mass communications across facility occupants in the case of an emergency.

Additionally, we have embedded our mobile-device-based Bluetooth-enabled access functionality into an SDK that allows Kastle to partner with third-party 'property experience platforms' as their access control function. These providers offer a simple app enabling users to manage activities from their smartphone like rent payments, package deliveries, maintenance requests, pre-authorized visitor access, amenity usage reservations and more. Our Kastle SDK allows them to plug-in a Kastle Access Control solution into their pre-existing platform.

FMJ How does your company contribute to the global IT/cybersecurity platform at large?

K Because both our access control and video surveillance systems are cloud-based, these systems' data reside on our remote servers, removing them from any interlinkage with our client's facility on-site networks. This ensures that neither will provide any possible unwanted cyber access coming to their network.

We also use an open-standard interface so we can plug-and-play our access control functionality with other physical and logical security systems allowing us to provide our service and expertise across disparate locations, languages, economies — helping provide cyber-safe physical security around the world.

CSP IFMA CORPORATE SUSTAINING PARTNER

IFMA's **Corporate Sustaining Partners (CSPs)** are dedicated to the goals and work of the association, supporting every resource IFMA offers. These best-in-class organizations make a substantial investment in the facility management community with no guarantee of a tangible return. As advisers, topic experts and change leaders, they are committed to the success of the professionals they support.

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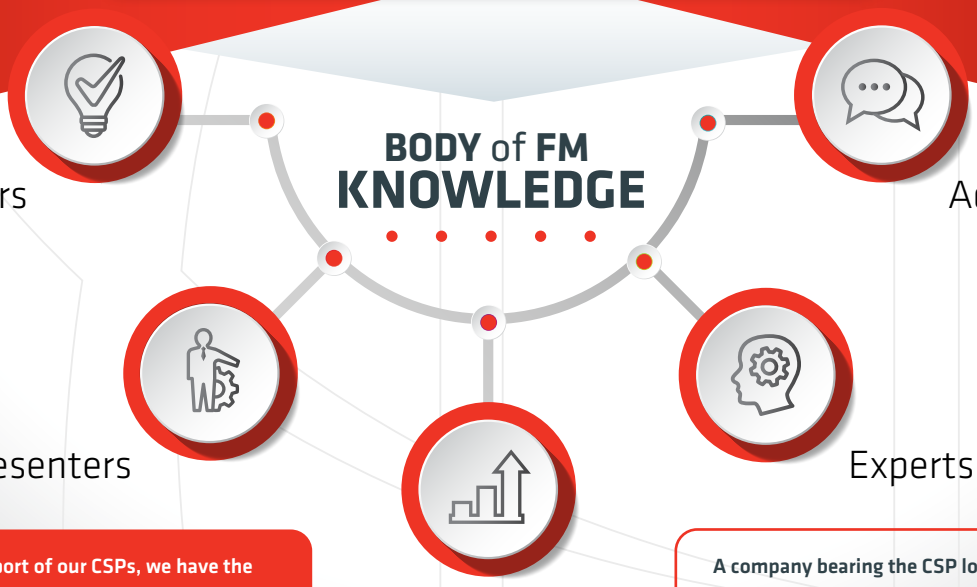

With the generous support of our CSPs, we have the means to deliver the quality, cutting-edge information that you've come to expect from your association.

CSP IFMA CORPORATE SUSTAINING PARTNER

A company bearing the CSP logo has made an investment in the continued advancement of the FM profession – they have made an investment in you.

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Innovative Products & Services

Smart valves offer precise control, integrated diagnostics and energy savings

Facility managers can benefit from more precise hot water flow in their zoning reheat systems using the new OptiPoint™ smart valves from Automated Logic Corp. (ALC). The valves feature communicating actuators that allow ALC terminal unit controllers to manage reheat valve positions directly using serial commands. This communications technology offers more precise control than conventional zone valves, as the actuator is capable of modulating to any position as directed by the controller and provides exact position feedback for diagnostic purposes.

OptiPoint smart valves join ALC's fast-growing family of communicating peripherals. Offering seamless connectivity to the WebCTRL® building automation system, they provide operators with access to valve performance data from anywhere, at any time, as well as quick error detection with integrated fault detection and diagnostics. Operators are automatically notified if a valve has failed, becomes stuck, or is cycling or leaking.

Smart valves are available for both pressure-dependent and pressure-independent applications and feature a compact design for easy installation in tight spaces. The valve bodies snap directly to the actuator without the use of tools. More energy efficient than typical valves, they feature a patented brushless DC motor that runs at only 0.3 W, maximizing energy savings. The actuator also uses 95 percent less energy than classic digital output actuators that require constant power, while a ball valve design with zero leakage also eliminates energy loss.

"This is a much-needed technology that I think will quickly become the norm in our industry. I hope I never have to install conventional control valves again."
– David Larson, Field Engineer, ALC Branch Office, Chicago, Illinois, USA

VISIT automatedlogic.com

OneVue Notify allows users to centralize communications and notify people quickly

OneVue Notify, Primex's visual messaging and critical alert solution, is an easy-to-use tool for businesses, education and health systems. The integrated platform allows administrators and executives to synchronize their critical communications and get messages out quickly in an emergency. Using an expandable ecosystem of InfoBoards, transmitters and cloud-based software, OneVue sends important alerts both visually and audibly.

OneVue synchronizes clocks and InfoBoards across a building or an entire campus. The 72MHz transmitter technology allows signals to penetrate further, up to one-half mile, with limited-to-no interference through the FCC licensing process. OneVue can also be integrated with existing communication tools, including PA, paging and other messaging systems. Customers using previous versions of the transmitter can upgrade to a new OneVue transmitter to take full advantage of InfoBoards while continuing to use their existing clocks. OneVue software simplifies the management process and allows users to operate the system from any device with a web browser, and access real data, real-time through customized reporting capabilities.

The OneVue ecosystem works in a wide range of settings, from smaller K-12 school districts to large universities, hospital systems and businesses of all sizes. The platform can be used to send alerts in a variety of emergencies, including extreme weather events, fires and active shooter situations. It can also communicate day-to-day messages related to schedule reminders and special events.

VISIT primexinc.com

Commercial-grade autonomous vacuum sweeper launches in North America

SoftBank Robotics America (SBRA) and ICE Robotics recently introduced autonomous vacuum sweeper Whiz to the North American market. Following a successful launch in Japan and select markets across Asia, Whiz has already put its innovation to work in commercial spaces across the U.S. in pilots at airports, hotels, offices and campuses, and was voted the 2019 ISSA Innovation Award Category Winner for Equipment by cleaning industry professionals.

Whiz is powered by BrainOS®, the award-winning commercial robot operating system, and can record up to 600 cleaning routes, for which staff teach the robot the initial floor cleaning route upon their first use. Subsequently, routes are stored in Whiz so it can repeat the cleaning route autonomously on its own. Through cloud data visualization, cleaning and status reports on Whiz can be gathered and analyzed.

With its small build and computer vision navigation, Whiz can navigate its way close to walls and avoid obstacles, while the notification pager can send real-time alerts in case of any unexpected issues. Whiz can clean areas up to 15,000 sq. ft., the size of three basketball courts, for three hours on a single-battery charge.

Whiz marks SBRA's latest evolution in their robotic portfolio. Banks, retailers, hotels and hospitals have benefitted from SBRA's humanoid robot, Pepper, engaging and helping customers at the front-of-house. Educators have benefitted from both Pepper and NAO, their smaller humanoid robot, in the classroom. Partner robotics companies, such as Simbe and ICE Robotics, are integrated into SBR's global inventory and distribution network. In their next step of augmenting the workforce through automation, Whiz is designed to benefit the commercial spaces we expect cleanliness from, use and maintain on a daily basis.

VISIT softbankrobotics.com/us/

Partnership shows value of an integrated approach to infection prevention

An industry innovator in infection prevention for more than 40 years, PDI recently acquired a majority share of Tru-D® SmartUVC, a pioneer in the UVC disinfection industry and maker of the first UVC robot. The addition of Tru-D extends PDI's Environment of Care portfolio from hard-surface to total-room disinfection and addresses the industry's need for an integrated approach to infection prevention.

Introduced to the health care industry in 2007, Tru-D is one of the most precise automated UVC disinfection systems available and continues to be the gold standard in germ elimination in the U.S., Canada and Europe. UVC energy is an effective and eco-friendly way to reduce the risk of dangerous microorganisms – including C. difficile, one of the most deadly and hard-to-kill microorganisms commonly found in health care environments. Operating from a stationary position, Tru-D accurately calculates the precise dose of UVC light needed to kill up to 99.9 percent of harmful pathogens and provides real-time reporting and analytical support for health care professionals.

VISIT pdihc.com or tru-d.com

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Member Spotlight

BRYAN GOOLD

Portland, Oregon, USA
Facilities & Construction Manager
Years in FM: 20

Why did you choose FM? I didn't really choose facility management, I found myself looking for a new career and when I began in FM and it kind of took over my life. There is so much to do to existing properties to update, enhance or improve that days were long. Then after a few years in the industry, I found myself critiquing every building or property I would be at, whether it was under contract or just a personal visit – that's when I knew FM chose me.

Tell us about your most challenging project and what did you learn? Some projects seemed challenging at the time, but I have used the experience over and over that it's crazy to think the first time I ran into it was so difficult.

What advice would give to someone just starting out in FM? Contract review and negotiations, industry education and networking are a must for success.

What's the best FM advice you've received and from whom? Develop win/win relationships – Mark Browning, CEO Varsity Facilities Services 2006-2010.

What do you hope to gain from your IFMA membership? Industry education and networking.

> **Tell us a fun fact about yourself.** I love to cook outdoors. I am regularly told I look like Guy Fieri, so for Halloween 2018 I dressed up like him.

linkedin.com/in/bryangoold/

ANDREW HARRINGTON

Bethesda, Maryland, USA
Director of Facilities
Years in FM: 15

Why did you choose FM? I enjoy the fast-paced environment, the diverse days and the ability to see physical changes take shape from concept, to design and then construction.

Tell us about your most challenging project and what did you learn? My most challenging issue (project) is staffing. Managing my current team and finding good/qualified individuals to replace staff as they exit or retire.

What advice would give to someone just starting out in FM? Don't be afraid to ask questions and ask a lot of them.

What's the best FM advice you've received? Don't let them see you sweat.

What do you hope to gain from your IFMA membership? I hope to gain my CFM, learn from my peers and better serve my current employer.

> **Tell us a fun fact about yourself.** I was adopted.

LAUREN HEMPHILL

Colorado, USA
Sales Executive
Years in FM: 7

Tell us about your most challenging project and what did you learn? At a previous company we were helping a new school with all of their furnishings and we did not start the process early enough so there were some delays. I learned to start earlier than you think you need to or work with a company who can provide quicker shipping!

What's the best FM advice you've received and from whom? Shahana at HomeAdvisor – create work environments that make people want to be there.

What do you hope to gain from your IFMA membership? I would love to meet FMs who are moving, remodeling, or their company is growing and they need a quick, simple, and quality solution for their furniture.

> **Tell us a fun fact about yourself.** I lived and worked in Cabo San Lucas, Mexico, for four months.

linkedin.com/in/lauren-hemphill-7000ab55

MARGARET JASINSKI

Orlando, Florida, USA
Area Manager
Years in FM: 3.5

Why did you choose FM? Water management program support and operations pair up with FM/engineering. They work hard to ensure building water safety and efficiency. It is a privilege to work directly with FMs.

Tell us about your most challenging project and what did you learn? Strategically planning for and successfully executing the Phigenics Smart Water Leadership Summit in Orlando in 2018! I learned that strong team friendships make any challenge that much easier to overcome and in the end, seeing the positive results and the gratitude of the participants at a large-scale event is priceless.

What advice would give to someone just starting out in FM? There is no need to feel like you have to do everything on your own. Bringing partners on board to complement, support and maximize your operations can be a win-win.

What's the best FM advice you've received and from whom? "Trust, but verify" from one of our facility director partners. I couldn't agree more, and being in a position to independently support organizations in verifying their water safety and efficiency efforts is something my team is very proud of.

What do you hope to gain from your IFMA membership? Community, networking, education and contributing to a greater purpose that positively impacts the membership.

> **Tell us a fun fact about yourself.** English is my second language.

linkedin.com/in/margaret-jasinski/

WANT TO SHARE YOUR MEMBER OR COMPONENT NEWS?

Reach out and share your chapter news with other members and FMJ readers. Send details and photos (if available) to bobby.vasquez@ifma.org with the subject line: Components in Focus.

We look forward to featuring your chapter in an upcoming issue!

THOMAS JUNDANIAN

Chicago, Illinois, USA
Project Manager - Facility Condition Assessment

How long have you been in FM? I am currently preparing to take the FMP exam to transition my career into facilities management.

Why did you choose FM? I love collecting, analyzing and synthesizing data to know when and determine how to improve the performance and functionality of facilities through their life cycle, which will improve the performance and experience of users/employees/customers during that life cycle. As a result, the occupants will achieve their organizational goals as well. We spend roughly 87 percent of our lives indoors. Let's make the most of ourselves by making the most of the environments in which we spend our time and achieve our personal goals.

> **Tell us a fun fact about yourself.** In my free time, I enjoy hiking and backpacking, playing disc golf, learning to play guitar well enough that someone else might actually want to listen, and reading books about 19th century American history.

KAYCEE RUFFIN

Mobile, Alabama, USA
Facilities Specialist – Subcontractor Manager
Years in FM: 3.5

Why did you choose FM? I had an opportunity to do something different. Although it was just answering phones for what was then known as EADS North America, it beat the day-in, day-out "real life" court drama of working in the DA's Office of Mobile County. I remember during training, seeing this young lady everywhere interacting with everything and everyone. I was mesmerized and empowered from that moment on. I politely asked her, "Who are you and what is it that you do to be everywhere?" With a big smile she answered, "I'm Brooke Barker and I am in facilities." From then on I knew what I wanted to do for the rest of my life.

What advice would give to someone just starting out in FM? Being ambitious is a great thing, but it can also be the undoing of something even greater. Allow others to help. Nothing is menial, especially if you are willing to do it yourself.

What's the best FM advice you've received and from whom? Knowing, not just guessing, the desired outcome for a particular task/project can make all the difference in it being successfully completed - Marirose Ziebarth, Leadership University

What do you hope to gain from your IFMA membership? Specialized skills to help me learn more about my career in FM and gain opportunities to grow and sharpen the skills I have obtained in my current role to help with advancement into a new role in FM.

> **Tell us a fun fact about yourself.** I can swim the entire length of a residential size pool without taking a breath.

Social Media: linkedin.com/in/kaycee-ruffin-055556116/

JULIAN SIPIORA

Chicago, Illinois, USA
Regional Sales Manager
Years in FM: 6

Why did you choose FM? I chose FM because I enjoy working in buildings! I am blessed to live in a city with such historic and beautiful architecture. I like to enjoy the views while walking downtown, but I enjoy the inside of the buildings just as much.

Tell us about your most challenging project and what did you learn? While working for Otis Elevator in Chicago, the city passed an ordinance that mandated every building with elevator recall be updated to reflect 2001 code. In almost all cases, existing buildings are "grandfathered" in to conform to the code in effect when the elevator was installed. This was not one of those cases. I was managing a project where we had to retrofit an auxiliary controller for a 1960s vintage relay logic elevator so it would operate the firefighter service feature to pass 2001 code. The project was for six elevators in a beautiful building. It was extremely challenging but thanks to a highly seasoned foreman, we were able to figure it out.

What advice would give to someone just starting out in FM? Learn as much as you can! Buildings are complex and knowing a little bit about everything will lead to a successful career. FM can open many doors in the world of commercial real estate.

What's the best FM advice you've received and from whom? This isn't specific to FM, but I personally have applied it to FM. If you are serious about learning how to do something, go work (for free if necessary) for someone who does it well. I took this nugget of advice from a podcast series I listen to, Bigger Pockets.

What do you hope to gain from your IFMA membership? My goal is to expand my network through IFMA. This group is filled with smart professionals whom I can learn from. I hope to attend at least one event per month to meet as many people as possible.

> **Tell us a fun fact about yourself.** I walked-on to a Division 1 baseball team at Illinois State University and ended up playing with three future major leaguers.

linkedin.com/in/juliansipiora/

SENTHIL VEL

Jakarta, Indonesia
Head of Engineering
Years in FM: 15

Why did you choose FM? I am passionate about the facility management industry.

> **Tell us a fun fact about yourself.** I am good at playing chess.

The shifts defining today's FM

BY PETER ANKERSTJERNE

As the new decade begins, it's interesting to take stock of the current state of the FM industry and understand the key trends and movements that have defined it. During the development of FM over the past 40 or so years – from its early inception to its present state, there are some interesting shifts which have had a fundamental impact on the industry and defined it to what it is today. These shifts also give FMs an indication of where the industry is heading.

The beginning of an industry

FM was born out of a technical engineering mindset and a wish to optimize and professionalize all the aspects of effectively managing the asset — technical maintenance, M&E, HVAC, energy, janitorial, security and so forth. Typically, most of these disciplines were performed by in-house staff. As the decade progressed, more services were outsourced providing a market for companies who became responsible for establishing and growing the FM industry.

As the industry grew and FM outsourcing became more successful, more large service companies entered the market in the mid 1990s. The upside to this development was the industry adopted a stronger service management approach, where hospitality, design thinking and service quality influenced how FM was managed and delivered. The self-delivery model began influencing the market as a true FM integration approach and a real alternative to the managing agent model.

In the mid-2000s another new change, Corporate Real Estate, began influencing the FM market. The large CRE companies were at the periphery of FM but were largely concentrated on brokerage, developments and capital projects. They realized FM offered a good strategic fit to their existing business and provided a more stable income stream that was less influenced by macroeconomic fluctuations.

The Workplace Revolution

Over the past decade there has been another dramatic shift in the way FMs do business, which is unlike anything since the Industrial Revolution. This community-driven social phenomenon is happening on a global scale at an increased pace and is changing the way people work and interact with each other at the workplace.

A key driver to this development is the availability and access to prime real estate to build and foster a community based on shared experiences and the freedom to flourish creatively. Using the workplace to allow a team to work together on projects with and for people who are like-minded and have similar interests and goals.

This development is breaking down tra ditional organizational barriers as HR, IT, CRE, finance and FM need to work closely together to develop new workplace strategies, enabling a different workplace experience. This experience should be centered around allowing corporate culture to flourish while permitting employees to become more engaged, productive and flexible in the way they work. Co-working is part of this trend and should be a complementary element in the workplace strategy toolbox.

Corporate teams need to see the workplace experience and co-working as an integral part of FM as it is a key focal point of organizations' ability attract and retain talent and future-proofing their business. No doubt that in terms of working with workplace experience, technology is becoming the enabler. The enormous growth from the tech sector has been driven by customer choice.

The next big thing

Traditionally the FM industry has been a late bloomer when it comes to IT and it is still waiting for the big breakthrough in terms of companies disrupting the market with new technology solutions, robots and platform systems. There have been a lot of developments within CAFM, IWMS, BIM and lately within sensor technology and smart buildings but it is still in its early days, relatively expensive and has not yet been widely adopted.

The property technology market, or PropTech, is booming and will continue to grow. So much technology is being offered to the market both as part of a growing start-up community but also from established companies. The market is still somewhat fragmented where standards, protocols, and data-requirements (especially around GDPR) need to be more firmly established. The opportunity for PropTech developments is driven not only by the sheer size of the market but also by the historically limited amount of innovation within the FM industry.

PropTech companies will capture a large part of the market over the next decade. The next big FM change will come from companies that introduce solutions to digitize workflows and elevate transparency and choice for every stakeholder in the workplace ecosystem. There is every indication that technological progress will continue to shape the future of this industry.

So, as technology will drive change, so will the continued urbanization of the society and the drive towards smart cities — which is closely linked with the technology development and where FM plays an important role.

These new smart cities are involving communities and universities alongside big companies and government authorities. This has helped shift the focus of smart-city projects onto the needs of residents. Successful smart-city projects blend disciplines, bringing together experts in behavioral change alongside specialists in artificial intelligence and IT. Interdisciplinary work can be messy and difficult, it can take longer, and it may not always work — but when it does, it can bring real benefits to the entire society.

If FMs have the courage to act on this insight, they are uniquely positioned to drive the change, especially within workplace experience, space-as-a-service and PropTech. It is important not to be bystanders and observe when industry shifts happen. Instead, FMs need to embrace the opportunities it provides and help their organizations adapt to the change to allow them to become early adopters and reap the benefits, that industry professionals are able to provide. FMJ

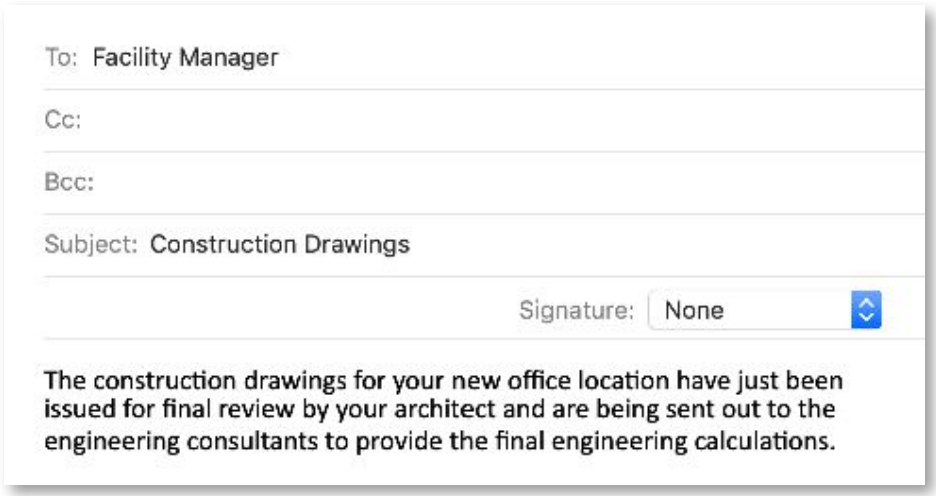
Peter Ankerstjerne, *MBA, COP, FRICS, IFMA Fellow has spent more than 25 years covering most aspects of facility management, service management, outsourcing, marketing and strategy development. In April 2019, Ankerstjerne joined WeWork as SVP, Head of Digital FM and Workplace Experience for the EMEA region. He is the author of 10 industry white papers and co-author/editor of six white books developed in a collaboration with IFMA and the Copenhagen Institute for Future Studies. He joined IFMA in 2006 and has been on the Board of Directors since 2016. During the past year he has been serving as the Second Vice Chair. Ankerstjerne is a former IFMA Foundation trustee and is actively involved in the industry as both a speaker and a debater. He is a member of IFMA, CoreNet, RICS and IAOP. In 2015, Ankerstjerne was appointed as a Fellow of the Royal Institution of Chartered Surveyors (FRICS) and in 2016 he was named IFMA Fellow.*

DIGITIZING PROJECT WORKFLOW:

HOW TO COLLABORATE IN THE 21ST CENTURY

BY BOB FOX

Imagine a project's FM sitting in the office sifting through emails when they open an unread message. It reads,



The email included a list of equipment to be calculated but, as the FM is reviewing the list, they suddenly realize that their COO had just sent a note about a new security system. It was an all-staff email and includes instructions on the operation of the new system and referred any question to the IT department. The FM suddenly realizes that the new office has been designed with the old system and is, therefore, out of date before it was even built.

Fear and frustration set in after realizing they just issued a set of drawings for a new 50,000-square-foot facility that now needs to be redone. The IT department knew about the system, but their review meeting got pushed back to next week. What's worse is that this system requires readers and sensors that need to be embedded into walls and conduit for power that needed runs back to the panel. This means coordination with IT, electrical, lighting, security and back-up systems, not to mention the external consultants, are needed.

The connections and the number of disciplines involve a significant amount of coordination, considering the change orders, extra costs, and the delays.

This situation is all too common and becoming more common as facility managers are struggling to manage and coordinate vast amounts of information, often with improvements and lots of change that take place in real time, during the process. The traditional system is proving more of a hindrance than a help. How does one manage and coordinate such large amounts of information?

CONSIDERING A WEB OF ASPECTS

Projects are becoming more complex and many more experts are involved. The above scenario is just one example of what can happen. Because there are so many complex aspects that need to be considered, successfully completing a project on a timely, on-budget manner is a challenge. The amount of communication, interaction and coordination becomes exponential and the traditional process of iterating through each phase of schematic design, design development and construction documentation does not always help to serve the project well when schedules are getting shorter. Projects now require more coordination and communication among professionals from a variety of rapidly increasing disciplines that need to be integrated.

Technology can help to solve that problem and, today, it is required to do a job well as a different thinking in order to be successful. While many members of a team know how to use various technological tools, not all members are on the same level of expertise. Various members may not be using the same format, process or methodology.

THE SOLUTION

As the number of experts and large amounts of information steadily increase, there are a few tools that facilitate collaboration for real time documentation such as Revit and BlueBeam and real time communication such as Slack and Zoom. There are traditional tools such as email and texting that are used in conjunction with these methods.

Not everyone on the team will be as proficient or have the same standards. Even with the same tools, their process and their methodology can be different. This is especially true for coordination among larger teams and between project managers, designers, consultants and FMs.

To coordinate across all parties, teams using building information modeling (BIM) documentation tools, like Revit and Bluebeam, need to take extra steps to define the expectation and process for sharing information. The industry has long had standards and conventions for documenting projects, but there is no consistent method for using new tools.

In most cases FMs and consultants are not proficient with these tools, but their expertise is required to execute these projects.

One solution is to bring a team together during the initial set-up phase and define the expectation and communication process. Each organization should have an expert setting up a standard and process and training internal teams. One firm can take the lead or multiple firms should get together and agree on the process. The technology-proficient members of the team need to educate others about the process for designing and managing within the platform.

Everyone on the team needs to be a part of the process and engage in technology, otherwise the system will slow to the lowest common denominator. Outdated and inefficient methods increase cost and time to completion as well as add unnecessary confusion. If no one gets comfort-

able with newer forms of technology then people are forced to use older, slower and riskier methods (riskier, because there are multiple copies and one may get caught using outdated information). Those who are forced to copy documents, create new documents, then wait for the document to be sent back with comments are only slowing things down. This increases the time and communication spent, causes a capabilities gap by adding extra steps and costs, and poses a risk to tracking information.

Every party involved in a project — project managers, designers, consultants, FMs — should use tools that enable documentation and its information. These tools can be shared and coordinated daily with a variety of team members. Models can be updated daily with new information and everything is much more accurate and seamless. Accuracy will be much better, more detailed and quicker decisions can be made effectively.

Tools for efficient, real-time communication such as Slack and Zoom have revolutionized the ability to collaborate on complex projects and they should be used by the entire team throughout the project lifecycle.

The benefits of using these tools are significant and offer increased performance for large teams. Using tools for BIM documentation and real-time communication enables team members to do a variety of things. Using Revit, individuals can create, edit, and explore a 3D model of the building, simultaneously work within the same model, modify work and identify conflicts, and view renderings down to mere inches to increase precision. BlueBleam allows individuals to work in both text and sketch formats, work online with multiple users, view and edit PDFs, coordinate among multiple parties, solve immediate problems, and eliminate lag times between parties.

There are also benefits to using tools for real-time communication between team members. Slack allows users to create private, project-based group chats, share documents and problem solve as a group. Zoom allows for video conferencing allowing for efficient group-discussions that accommodate everyone's schedules in real-time. With these or similar tools in place, individuals can involve themselves in larger numbers of teams to coordinate and update information.

At the outset of the project, all team members should provide a brief on the support systems and coordination required for their specific scope. This information must get to the architect and engineer for project scope inclusion.

PUTTING THE SOLUTION INTO ACTION

The world is in a period of rapid change. FMs, consultants, project managers, and designers should not only be aware of what tools are now available but take advantage of the 21st century technologies that are revolutionizing capabilities and processes. As new team members are brought on to projects, colleagues can help bring them into the process and onboard them with these tools and engage in consistent communication.

At the industry level, there are opportunities for bringing processes into the 21st century by encouraging the use of tools for BIM documentation and real-time communication such as trainings and workshops at industry conferences or dedicated Slack channel for facilities managers and others who are learning these tools.

Technology is not an automatic fix for inefficient processes. There is still a human element to teamwork and a need for clear expectations around how the team will function. At the outset of a project, teams will need to define systems process expectations around the tools they use and clearly communicate the purpose and expectations of using these tools and create consistency among each team member's use.

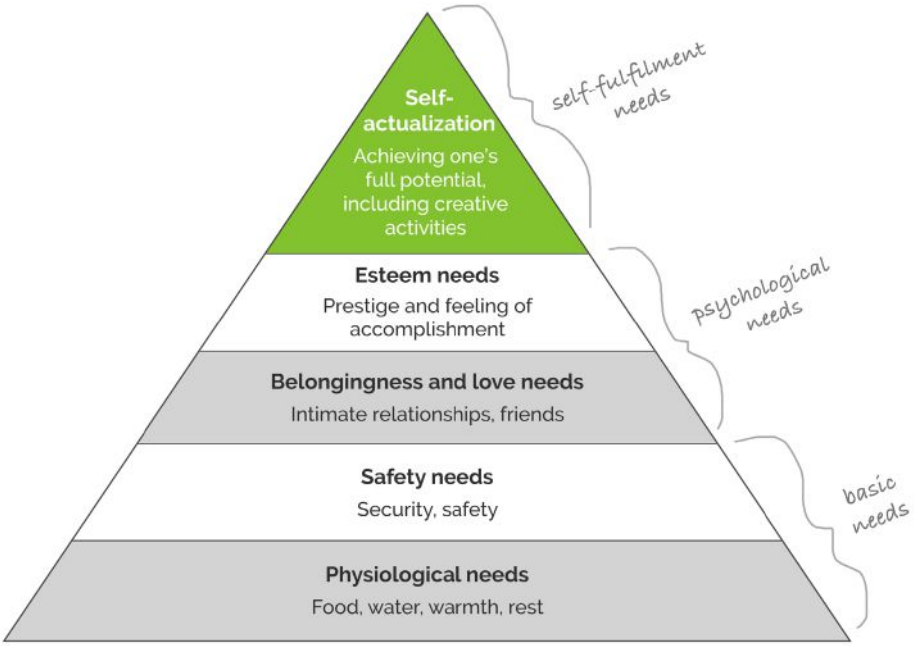
Another element based on culture is having the relationships in place to effectively hold each other accountable for using the tools consistently to contribute to the goals a team is aiming for. FMJ

Bob Fox *is Work Design Magazine's intrepid founder and publisher. He is also the founding principal of FOX Architects, a fully integrated, award-winning architecture and interior design firm with an office in Washington, D.C. He has more than 30 years of experience in the industry, inspiring those around him to think big about the workplace.*

Tech trends creating the workplace of the future

BY JOHN ANDERSON

Business and culture trends are redefining the way we work, paving the way for more sustainable, adaptable and productive workplaces that influence behavior. In turn, technology is emerging to enable this transformation, bringing new capabilities to facilities managers and occupants in 2020 and beyond.



To attract talent, unleash the potential of their people and build sustainable business models in a fast-changing marketplace, organizations are under pressure to continuously improve and innovate.

In his famous Theory of Human Motivation (1943)[1], psychologist Abraham Maslow revealed an approach to eliciting peak performance, at both an individual and organizational level. He described how humans can focus on just one level of need at any given time. First, basic needs must be taken care of, such as food, water, warmth, rest and safety. Then the focus switches to psychological needs, such as relationships and feelings of accomplishment. Once these psychological needs are met, people can focus on self-actualization: achieving their potential.

Applying Maslow's pyramid to the workplace, FM focus has moved beyond the satisfaction of basic needs like lighting, HVAC and security, toward supporting high-level corporate objectives around innovation, collaboration and productivity.

Agile working: the new normal

To achieve these corporate objectives and meet the rising expectations of all stakeholders — from CEOs, suppliers and partners, to customers and workers — agile working arrangements are fast becoming the new normal.

Many organizations are implementing hot-desking as a first step, optimizing the ratio of employees to desks, to reduce their real estate costs and carbon footprint.

According to IWG's Global Workplace Survey[2], 62 percent of businesses worldwide have a flexible workspace policy and 67 percent of business leaders believe flexibility can improve productivity by at least 20 percent.

The survey also found that 80 percent of people, when faced with two similar employment offers, would turn down the one that didn't offer flexible working. As the war for talent rages, organizations are striving to embrace new working practices that offer greater choice in when, where and how work gets done, particularly when it comes to attracting and developing top talent.

According to psychology researchers Frank L. Schmidt and Michael K. Judiesch, an employee in the top 1 percent of performers in terms of productivity, is worth 12 of those in the bottom 1 percent; and for high-complexity jobs, the differential is so large that it cannot be quantified.

Evidence is mounting that these talented workers expect greater autonomy and a slicker workplace experience than ever before. FMs have a fundamental role to play in creating these conditions from which peak performance emerges. This is made possible by adopting new processes and tools, including predictive analytics driven by machine learning, smart space utilization platforms and consumer-grade mobile functionality.

Beyond flexibility: autonomy is key to improved productivity

In 2020 onward, more organizations will leverage these technologies to shift beyond flexible and work-from-home options, to offer a work anywhere environment. This focus on employee choice is critical. In addition to providing a superior employee experience that strengthens their employer brand, it helps organizations achieve corporate objectives around profit, sustainability, innovation, well-being and productivity.

Yet not all workers will choose to fly off to the Bahamas and work from the beach —and even those who do, may not want to do it all the time. Many value the office as a place where they can do their best work, build relationships and learn from others. Ultimately, some people prefer to work from the office, some prefer to work elsewhere and others choose to strike a balance, popping in and out when it suits them.

Researchers at Stanford University con-

> GO AFTER THE CREAM OF THE CREAM. A SMALL TEAM OF A+ PLAYERS CAN RUN CIRCLES AROUND A GIANT TEAM OF B AND C PLAYERS.
>
> – Steve Jobs

ducted a two-year study[4] at China's largest travel agency that revealed a dramatic 22 percent increase in productivity from telecommuting, equivalent to a full day's work each week, while employee attrition went down by 50 percent. At the same time, less travel resulted in a lower carbon footprint and a reduction in headquarter office space that saved almost $2,000 per employee.

Interestingly, when workers were given a choice about where they wanted to work, performance gains were twice as high as when they were told to work from the office or from home.

The positive correlation between worker autonomy and productivity was also revealed by researchers at Harvard Business School when they studied[5] the impact of implementing liberal work from anywhere arrangements at the U.S. Patent and Trademark Office. Productivity increased by 4.4 percent versus traditional work-from-home policies, while revenue increased, office costs were slashed and hiring costs were reduced Improved productivity meant fewer new hires were needed to complete the work. Workers boosted their earning power by moving to less expensive regions, and at the same time, decreased carbon emissions through fewer office commutes.

A new era of choice

The workplace of the future is all about choice, a place where autonomous workers choose to be, when it suits them.

Since the modern workplace is competing with alternative workspaces, FMs must provide a stimulating and fit-for-purpose experience in the office that enables people to work productively, collaborate effectively, build relationships and learn new skills — in short, give them an outstanding experience that they can't get elsewhere.

A popular strategy in 2020 and beyond is activity-based working (ABW), a subset of agile working which provides people with a choice of workspaces designed for a specific type of activity, e.g. comfortable bean-bag areas for discussions, huddle rooms, collaborative spaces with interactive whiteboards, or pods for quiet concentration.

According to a report by Kinnarps[6], almost 70 percent of employees say working in an ABW environment gives them more energy, helps them achieve better results and is more stimulating.

British utilities company National Grid[7] certainly found this to be the case when they achieved an 8 percent increase in overall productivity and a reduction in operating costs of £8-10 million per year as a result of implementing ABW.

Smart space utilization tools

To minimize costs and optimize the workplace environment for different types of work, such as brainstorming or focused research, FMs must arm themselves with accurate, real-time data on space utilization.

Assessing which spaces are being over-used or under-used forms the foundation of an action plan, while giving facilities managers a way to measure what is and is not working. Correlating this usage data with wider datasets, such as productivity and employee engagement data, further enriches the picture, informing decisions around whether to create more an open plan or private spaces, introduce booths, or shift the office cafe to a different location, among other possibilities.

It is a common assumption that open office plans improve collaboration. Yet when Harvard researchers Ethan Bernstein and Stephen Turban studied[8] two corporate headquarters transitioning to more open office spaces, they found that the volume of face-to-face interaction decreased by 70 percent, while digital dialogue increased.

What works in one organization or team does not always translate to another. By using analytics, FMs can adopt an agile, lean, experimental approach to designing the environment that best meets their needs — while testing, learning and improving their workplace strategies based on reality, not assumptions.

Eliminating waste

Along with measuring utilization, FMs are using smart space utilization tools to reduce wasted space and energy, by eliminating no-shows: room and desk bookings that people fail to show up for. A report[9] by Unwired and Plow Consulting found 30 percent of meeting space is typically wasted due to no-shows. Collaboration and productivity suffer as a result, because spaces that appear fully booked cannot be used by those who need them, including spontaneous, unscheduled meetings.there is also the hidden cost of carrying space that is not fully utilized.

Strategic seating

FMs can also boost productivity using space utilization data by experimenting with seating arrangements.

Researchers[10] at Harvard Business School and Cornerstone OnDemand found workers' performance at a large tech company was influenced by whom they sat next to, and that rearranging seating increased organizational performance by 15 percent, adding US$1 million annual profit to its bottom line.

Similarly, a study[11] of a Korean e-commerce company found that when employees responsible for striking deals with suppliers sat next to new people, they landed 25 percent more deals.

FMs can use strategic seating techniques to create opportunities for collaboration and employee connectivity — or planned serendipity, just as Steve Jobs did through workplace design. Jobs purposely made sure that the large central bathrooms in Pixar's headquarters were positioned in the atrium, so most people had to take a long walk to use the facilities. He understood that this increased the likelihood that people would bump into one another, sparking spontaneous conversations.

FMs must provide a stimulating and fit-for-purpose experience in the office that enables people to work productively, collaborate effectively, build relationships and learn new skills ...

Consumer-grade mobile apps

Making it easy to book spaces and other resources, such as parking, AV equipment and catering — all through mobile devices — helps organizations create a seamless employee journey, while optimizing the ratio of employees to desks to reduce real estate costs and the carbon footprint.

Advanced, user-friendly mobile technology will enable a robust, convenient experience for workers — that rivals consumer apps — from any device. Ease of use is essential, as a study[12] by ArcTouch revealed only 12 percent of office workers use enterprise mobile apps, despite the ubiquity of mobile devices in the workplace. The lack of use resulted from poor user experience.

However, it doesn't have to be that way. Employees in agile working environments can use an intuitive app on their mobile device to tailor their experience, creating the right office set-up (including adjusting lighting and heating) for the type of work they need to do that day. Using data visualization technology, with smart space utilization data, employees can view a heatmap of the office, showing the most (or least) popular rooms and desks, so they can make better-informed decisions about what to book. Those working in a new office can view the office layout in advance and be directed to where their colleagues are sitting.

This kind of functionality supports an agile, activity-based way of working, while enhancing employee well-being and performance.

When mobile apps, space utilization tools and predictive analytics connect, employee experience can be taken to a whole new level. Studies[13] from Craig Knight and Alexander Haslam at the University of Exeter showed that designing and customizing your own workspace improves health, happiness and productivity.

The Edge in Amsterdam, dubbed the smartest building in the world, enables this kind of customization, even changing the lighting and temperature based on a worker's known preferences.

AI & predictive analytics

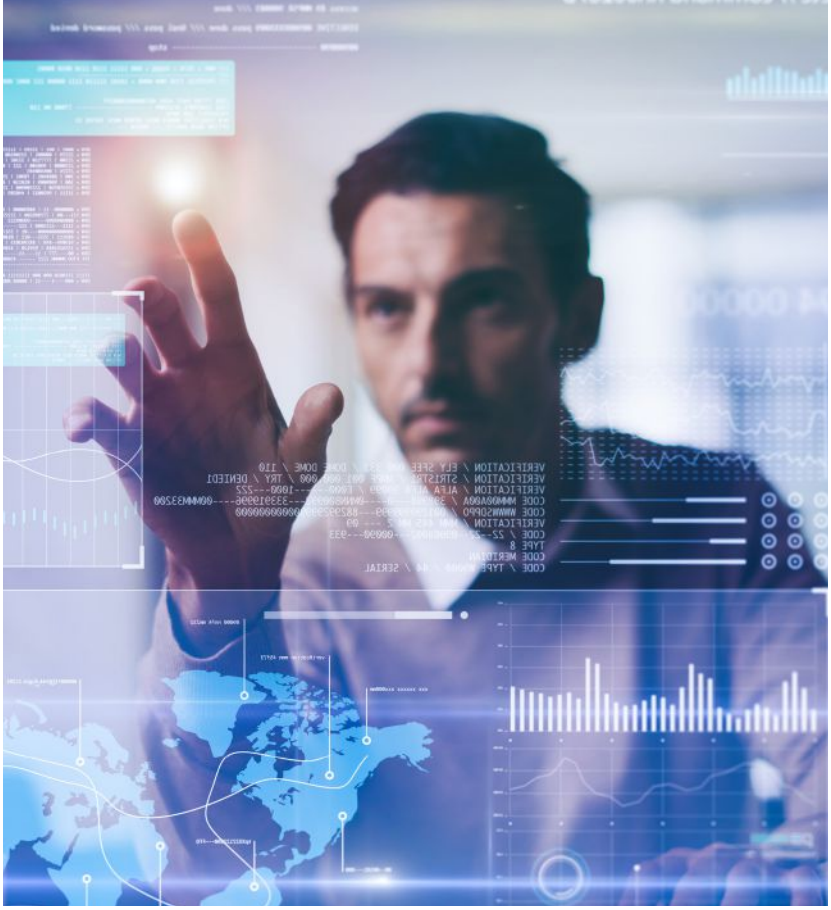
Predictive analytics has the potential to radically improve operations. While in use in a variety of fields, machine learning is not yet being widely applied in FM.

The future possibilities are exciting. By taking a large amount of data and using it to predict possible scenarios, machine learning could equip FMs with the insights they need to improve decision-making.

Data collected from sensors, for instance, can be used to project lighting, heating and energy usage. Based on business projections, hiring needs and current space utilization, predictive analytics could also anticipate changing space and real estate requirements, helping FMs stay a step ahead in providing the optimal workplace environment.

In 2018, Google revealed[14] they handed over control of cooling several of their data centers to an AI algorithm. During two years of testing, the algorithm learned how to adjust fans, ventilation and other cooling equipment, providing data center managers with recommendations to reduce power consumption. This resulted in energy savings of around 40 percent and gave Google sufficient confidence in the algorithm to put AI in control.

The Edge has deployed 30,000 sensors to collect building operations data, as well as data on occupant interactions. As a result,



Conclusion

Converging workforce trends and technologies are fundamentally changing the definition of work and the workplace. The workplace of the future is smart, sustainable, efficient, collaborative, agile and innovative. And, for employees, it needs to be an environment that supports autonomy and choice.

FMs are collaborating with executives in other areas, including HR and IT, to lead the way in creating environments in which creativity thrives, well-being soars and results flow in.

Given that people typically account for 90 percent of operating costs, anything that impacts their productivity has a disproportionately huge impact on top corporate objectives. This equation lies at the heart of the business case for adopting new technologies and workplace strategies in 2020 and beyond.

To rise to this challenge, facilities managers are widening the depth and breadth of their responsibilities and toolkit, becoming more strategic and leveraging technologies like smart space utilization, mobile and predictive analytics to influence performance and the ability for employees to reach their full potential.

various applications can direct people to parking spaces as well as close down sections of the building with low occupancy, to save energy.

According to UN estimates[15], real state accounts for about 40 percent of the world's energy consumption and a third of all carbon emissions. Sustainable practices are not only vital for the environment, but also provide key costs savings and represent brand values that are important to employees, customers and other stakeholders.

Machine-learning-driven FM software will not only aid human decision-making to improve sustainability, financial performance and employee experience, it will also enable organizations to make some decisions without human intervention by anticipating and solving problems that humans may not have thought of.

John Anderson *is CEO of Smartway2, which provides next-generation workspace scheduling solutions for enterprises across the globe. John is a seasoned technology executive with more than 35 years of experience building and growing profitable teams in small to large companies, and extensive experience in real estate and facilities technology. His previous positions included CEO and founder of Plow Consulting, board member and chief revenue officer for Condeco, EVP of Strategy for Manhattan Software (sold to Trimble Navigation) and CEO of PeopleCube (sold to Asure Software). He also held senior executive positions with Exact Software and Data General.*

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SENDING EQUIPMENT DATA *to the Cloud*

BY **SPYROS SAKELLARIADIS, PHD**

Facilities management systems are evolving in the same way as many computer, IT, or automation applications – they are 'moving to the cloud.' The benefits and risks of this move are hotly debated, and this article is not intended to contribute to that conversation. The position for moving to the cloud is well articulated here: https://docs.microsoft.com/en-us/azure/cloud-adoption-framework/strategy/motivations, Similarly a list of opposing views can be found in a simple Internet search: https://www.bing.com/search?q=why+not+move+to+the+cloud. What's missing and needed to help FM providers and Master System Integrators (MSI) understand the debate, is an understanding of what is involved in moving to the cloud. To fill this gap, this article outlines the basic mechanics of sending equipment data to the cloud, to demystify the process and assist in developing an understanding of how to harness the power of the cloud to better manage buildings. Finally, also missing from the debate is a clear explanation of the differences between managing systems on-premises versus in the cloud; however, that discussion is left to another article.

It is difficult to describe the mechanics of moving to the cloud without using concrete examples, and concrete examples necessarily contain references to specific vendors' products. Throughout the text, therefore, there will be references to commercially available software and services from ICONICS, PTC, Matrikon, and Microsoft.

Figure 1 shows the various components that typically need to be installed to send data to the cloud.

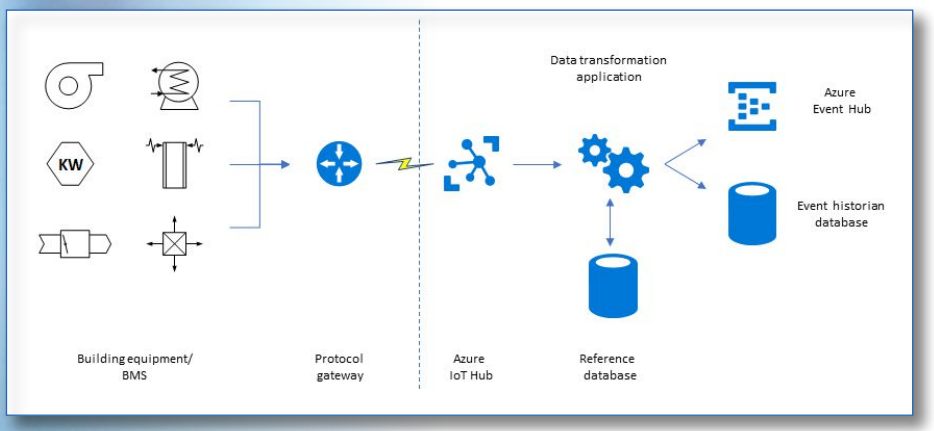


Figure 1 Components

OPTIONS FOR GETTING DATA FROM A BMS

To get the values from building or equipment sensors, either some component of system (the Protocol gateway in Figure 1) needs to query the devices or BMS, or the devices or BMS need to push data to that gateway. Some hardware suppliers are beginning to release devices that push data, but typically a gateway is installed that pulls data from those devices over a protocol such as BACnet, OPC- UA, or Modbus, and then transmits that data to the cloud.

Step 1: Configuring a gateway to get the data

The system integrator (SI) who configures the gateway needs to know how to reference the objects connected to the BMS, and how to identify which ones to poll. For example, if the controls engineer designated a series of objects in the BMS as BACnet instance IDs 190100 – 190200, the SI needs to configure the gateway to request data from some or all objects within that range. Furthermore, if the controls engineer identified points under those objects as AV 01 – AV 150, and added point descriptions, the SI needs to configure the gateway to request specifically some or all of those points. The way those objects are specified in the gateway depends upon the gateway software installed, for example ICONICS' IoTWorX, PTS's Kepware, or Matrikon's OPC Server for BACnet. Typically, objects can be entered manually or imported from a CSV or JSON file like the one below. Figure 2 shows an example of a few records the SI would need to configure in the gateway:

```
"Target_Devices_Range": [ "190105", "190298"],
  "Known_Devices": [
    {
      "DeviceID": "190105",
      "Objects": [
        {
          "Type": "0" /* AnalogInput */,
          "Instances": [ "10" ]
        },
        {
          "Type": "2" /* AnalogValue */,
          "Instances": [ "101", "100", "99",
           "90", "68", "67", "9", "4", "1", "0" ]
        },
        {
          "Type": "4" /* BinaryOutput */,
          "Instances": [ "2", "1", "0" ]
        }
      ]
    },
```

Figure 2 Building load sheet

Figure 3 shows data points in ICONICS' IoTWorX:

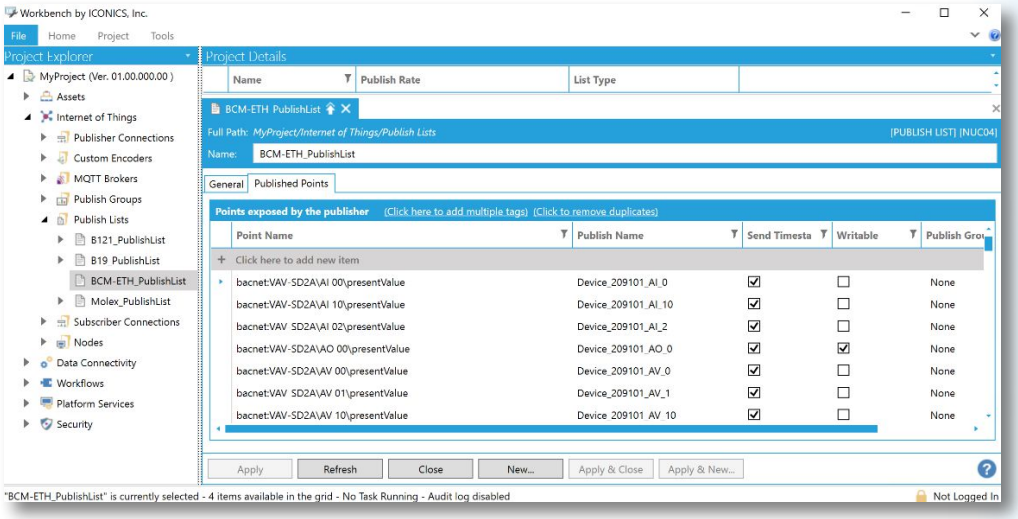
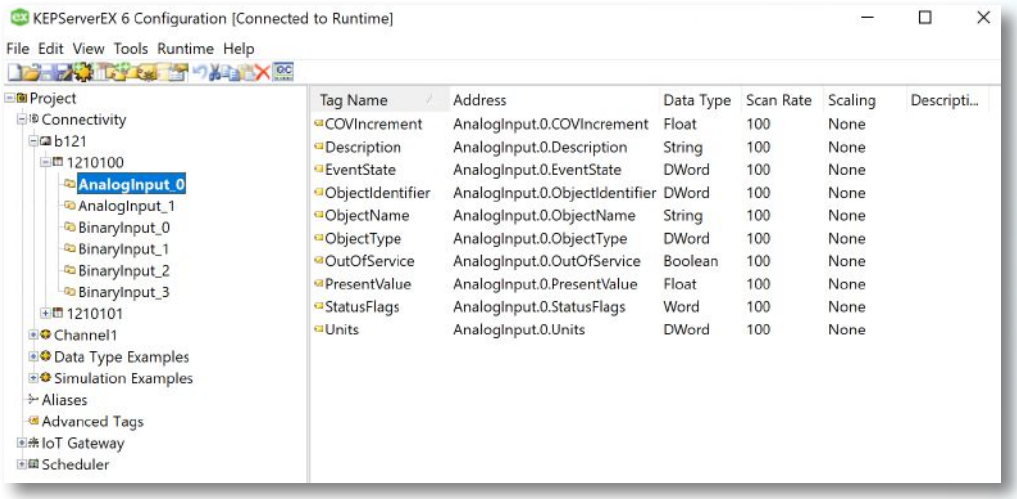
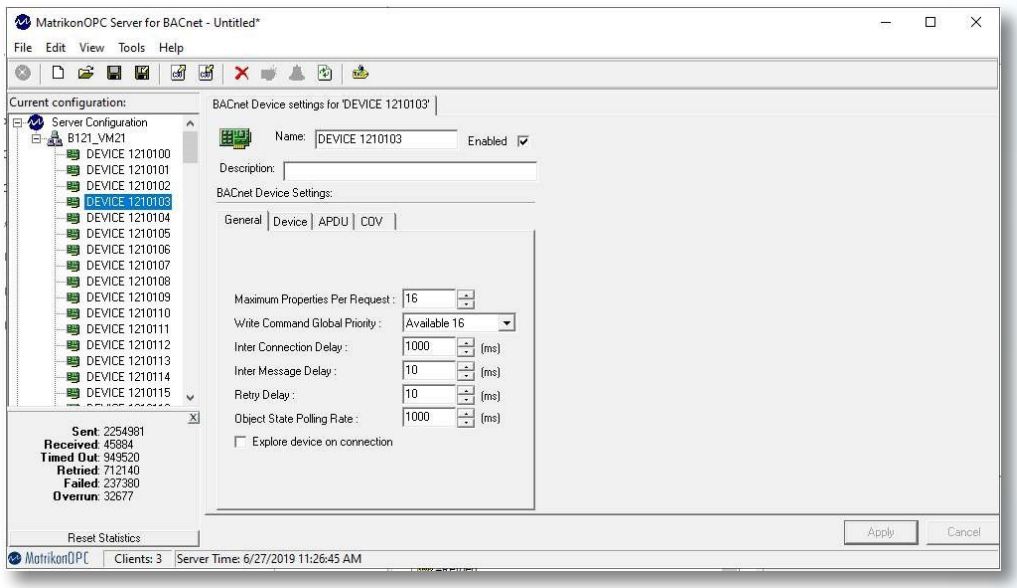


Figure 4 shows data points in Kepware's KEPServerEX 6:



And finally, Figure 5 shows the data point in MatrikonOPC Server:



Step 2:
Sending the data to the cloud

For the gateway to send the data to the cloud, it needs to be configured with the URL of where to send it. In Microsoft Azure, that endpoint is a service known as Azure IoT Hub, which is created in the company's Azure account. In Figure 1 above, this is shown as the "Azure IoT Hub". Documentation and Quickstart tutorials on creating an IoT Hub can be found at https://docs.microsoft.com/en-us/azure/iot-hub/. ***Figure 6*** shows multiple IoT Hubs created in an Azure subscription, viewed in the Azure portal https://portal.azure.com:

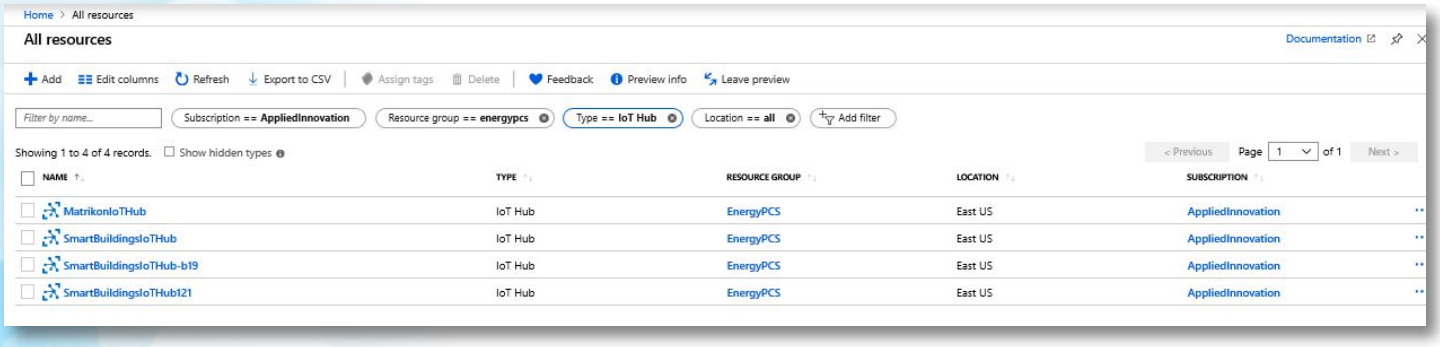


Figure 6 Multiple IoT Hubs in Azure subscription

Generally, only one IoT Hub is needed per installation, regardless of the number of buildings, BMS, or devices. Every IoT Hub instance has a URL and credentials for accessing, which are contained in something called a Connection String for the gateway registered in the Hub, shown in ***Figure 7:***

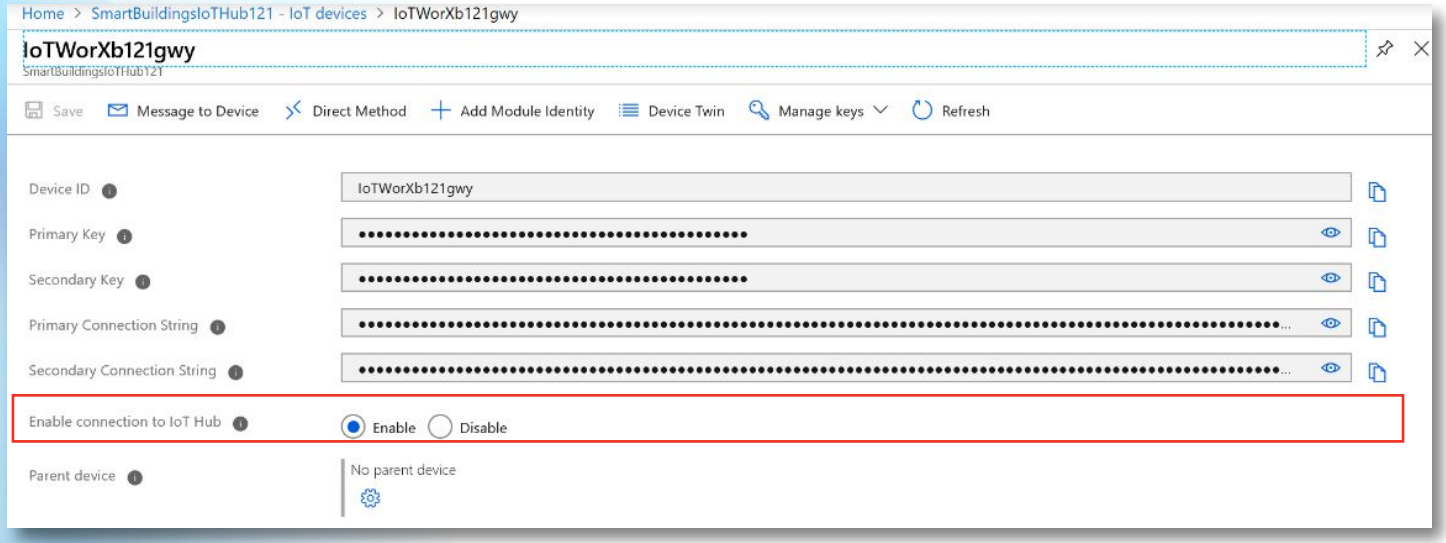


Figure 7 IoT Hub – IoT Device Connection String

The SI needs to copy that connection string into the gateway application in whatever manner the gateway software wants it. In ICONICS' IoTWorX, this is a Publisher Connection, with a field for the Connection String from the IoT Hub, shown in ***Figure 8:***

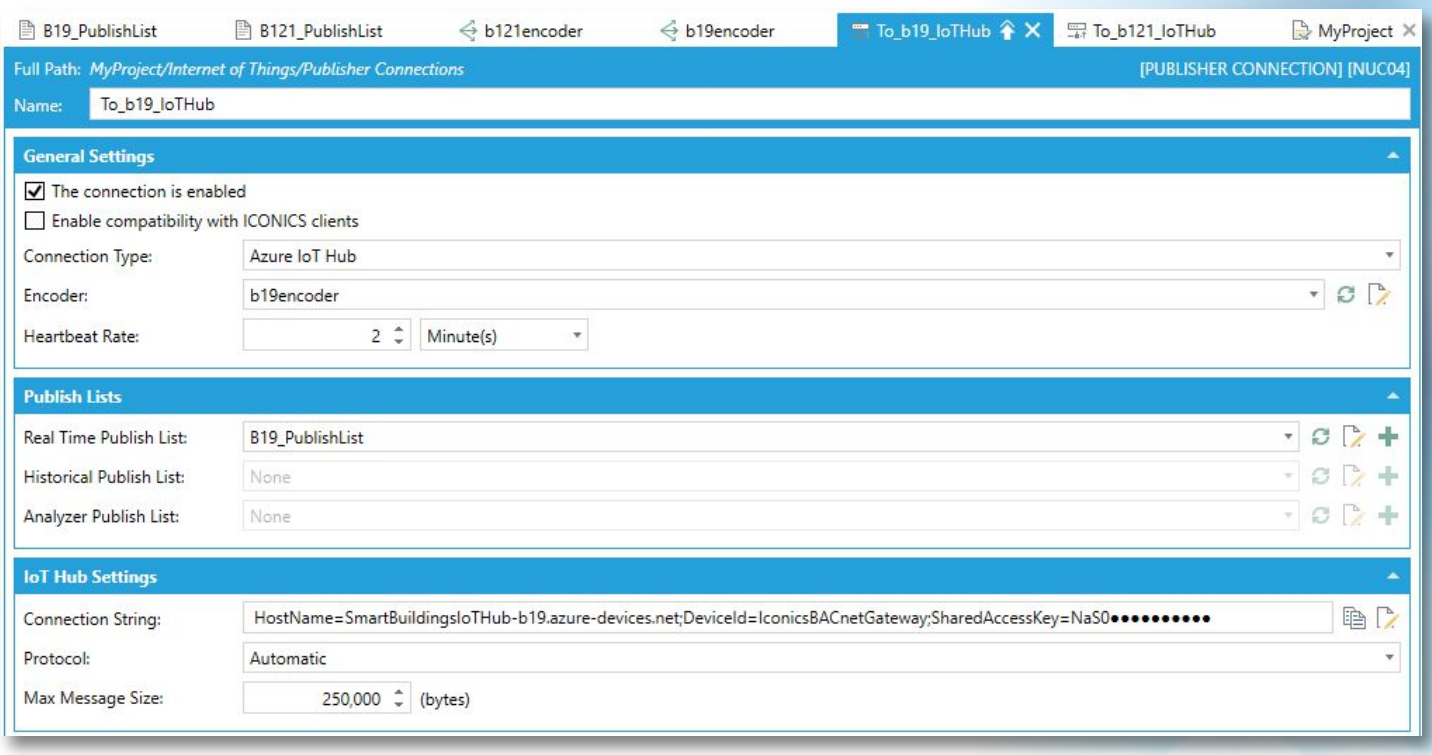


Figure 8 IoT Hub Connection String in IoTWorX

In Kepware's KEPServerEX this is configured in a properties window for the IoT Gateway:

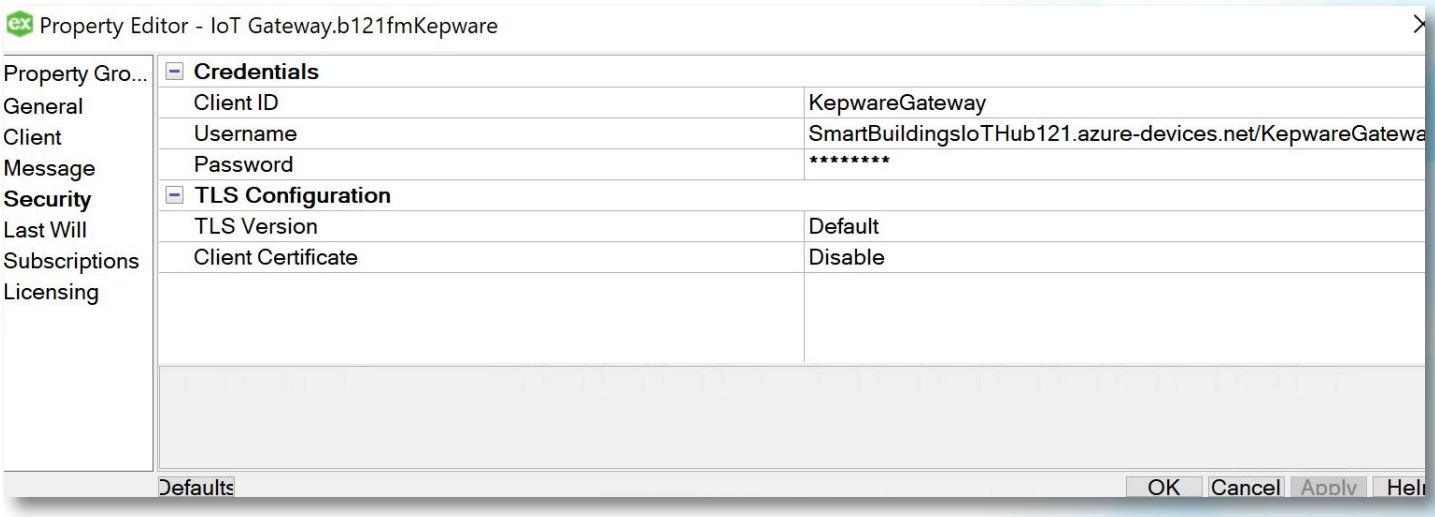


Figure 9 IoT Hub Connection String in KEPServerEX

Finally, in a MatrikonOPC Server for BACnet deployment, the IoT Hub Connection String is included in a command line instruction used to start the Matrikon IOTPublisher instance.

In all three gateways, once the connection to IoT Hub is established, the gateway sends the data from the objects to the address specified.

Step 3: Receiving the data

At this stage, all the device data is coming into the IoHub in the cloud in a steady data stream. To see the data, one simple way to do this is to create a job in an Azure service called Azure Stream Analytics that continuously monitors the IoT Hub for incoming data and pushes it to a SQL database. An example of a Stream Analytics job is shown below:

The Stream Analytics job contains an instruction, in the form of a SQL query, that governs how the data is sent to the target SQL database. In Figure 9 this query is a simple "SELECT * INTO [output] FROM [input]", where the input is the IoT Hub shown earlier, and the output is a SQL database. The output does not have to be SQL — it could be just a storage blob or another Azure service. In ***Figure 1*** this was referenced as the Event Historian.

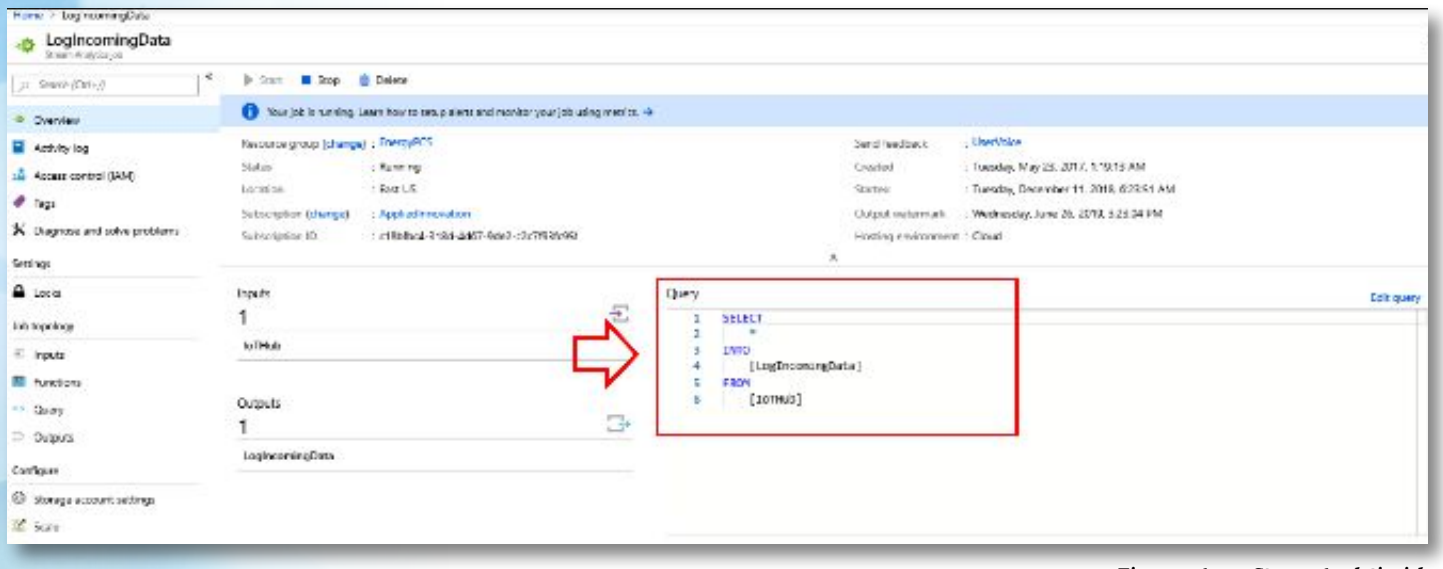


Figure 10 Azure Stream Analytics job

Step 4: Transforming the data

Before the data is useful, there needs to be some application running in the cloud to enrich it. This is because when the data arrives at the IoT Hub it is in a JSON string, typically looking something like the following:

```
{
    "Gateway":"b19Gwy01",
    "FullTagName":"Device_190107_AI_10",
    "Value":"155.000000
    "Timestamp":"2019-06-07T23:57:27.784Z",
    "EventEnqueuedUtcTime":"2019-05-23T22:50:40.7840000Z"
}
```

Figure 11 Raw data from device

What is needed, however, is something more like this:

```
{
    "Date":"5/23/2019",
    "Time":"10:50:40 PM",
    "Building":"B19",
    "Floor":"L01",
    "Unit":"A21",
    "EquipmentClass":"TERMINAL_UNIT",
    "Equipment":"VSVAV",
    "Tag":"FLOW STPT",
    "Value":"100"
}
```

Figure 12 Enriched data

To do this, the query shown in Figure 9 Stream Analytics needs to be modified. For example, to enrich the data as shown in Figure 11, there needs to be a lookup to some file or table that maps tag name to the physical location – a step-by-step article on how to do this can be found at https://docs.microsoft.com/en-us/azure/stream-analytics/sql-reference-data. In ***Figure 1*** the process is called the "Data transformation application", and the lookup table is called the "Reference database". Another way of doing this, instead of using Stream Analytics and SQL, would be to use Azure Functions and CosmosDB — an article on this can be found at https://docs.microsoft.com/en-us/azure/cosmos-db/serverless-computing-database. These and other methods produce the same result, populating the Event Historian, but the methods all have different performance, manageability, and price characteristics, and will need to be assessed.

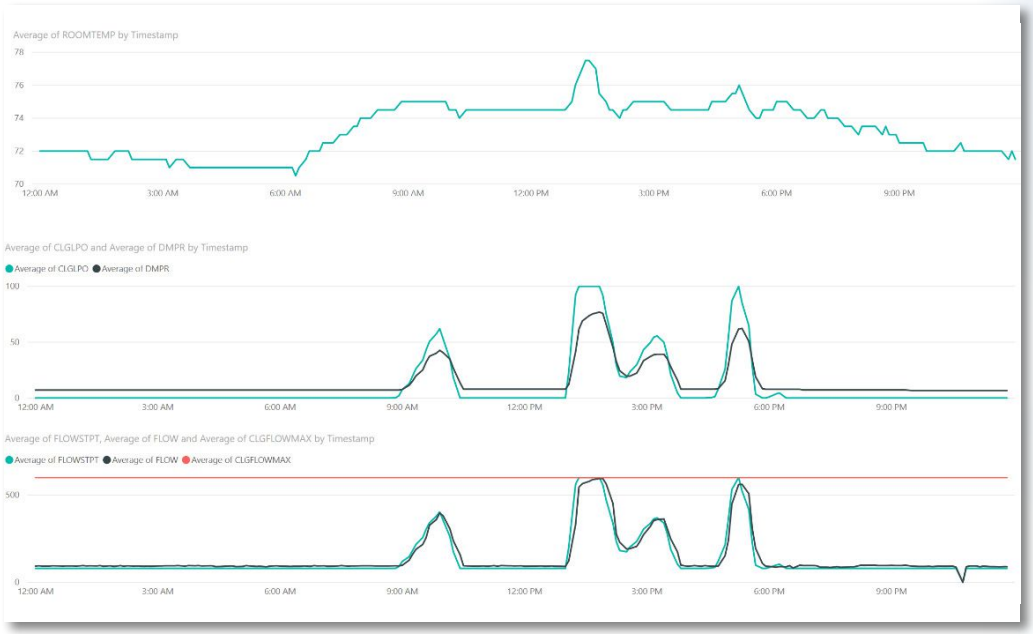
Step 5: Reviewing and analyzing the data without a third-party application

At this point, the equipment and building data is available in the cloud. Some of the Facilities Management applications available commercially today can be installed and configured to use this data as inputs to the application, typically by specifying the URL of the Azure IoT Hub. Other popular Facilities Management applications have this option on their roadmap. If there is no need for all the functionality provided by these commercial applications, it is simple to write a basic application to do a few straightforward analyses. For example, a query against that Event Historian table could result in a report such as this:

Date	Time	Building	Floor	Unit	EquipmentClass	Equipment	Tag	Value
5/23/2019	10:50:40 PM	B19	L01	A21	TERMINAL UNIT	VSVAV	FLOW STPT	100
5/23/2019	10:50:43 PM	B19	L01	A21	TERMINAL UNIT	VSVAV	HTG STPT	71
5/23/2019	10:50:29 PM	B19	L01	A21	TERMINAL UNIT	VSVAV	VFD	5
5/23/2019	10:50:43 PM	B19	L01	A20	TERMINAL UNIT	VSVAV	FAN CFM MIN	310
5/23/2019	10:51:01 PM	B19	L01	A20	TERMINAL UNIT	VSVAV	FAN	1
5/23/2019	10:50:42 PM	B19	L01	A20	TERMINAL UNIT	VSVAV	FAN CFM MAX	1600
5/23/2019	10:50:40 PM	B19	L01	A20	TERMINAL UNIT	VSVAV	CTL FLOW MIN	295

Figure 13 Equipment data from BMS

The data can then be viewed in an online Power BI dashboard, or in an Excel chart, or in any number of online or desktop applications. For example, here is the data in Power BI:



Another simple and useful query would show how many records are being received from the building. For example, ***Figure 15*** shows the results of running such a query:

Building	Date/time	Records received
B121	7/17/2019 16:49	5,214
B121	7/17/2019 16:40	5,214
B121	7/17/2019 16:31	5,214
B121	7/17/2019 16:21	5,214
B121	7/17/2019 16:12	5,214
B121	7/17/2019 16:03	5,214

Figure 15 Records received per minute

This report shows that every 8-10 minutes 5,214 datapoints are being received from the building designated as B121. This is a medium-sized building on the Microsoft Puget Sound campus, and to put it into perspective, the buildings on this campus send over 160M records per day to the cloud from over 500,000 tags. And in terms of the value achieved by monitoring and analyzing this data, Microsoft is saving 25% per year on the electrical consumption of its buildings compared to the year before we implemented the system.

Conclusion

Sending equipment data to the cloud involves a relatively straightforward process requiring a target application in the cloud to which to send the data, and a gateway on-premises to request the data from the devices or BMS. Assuming the building engineers have a good list of data points to collect, an experienced SI could set this all up literally in a matter of minutes and would never have to touch it again. Hopefully, this article demystifies the process of sending data to the cloud.

Spyros Sakellaridis *has more than 30 years experience in IT and has worked for Microsoft since 2003. He is currently working on creating and delivering Smart Building and Smart City solutions, with a primary focus on infrastructure, energy management, sustainability, and workplace safety scenarios. He works with the Microsoft engineering teams on new product ideas, consults with Microsoft's Real Estate and Facilities group on implementing these the products internally, and assists customers with their deployments.*

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