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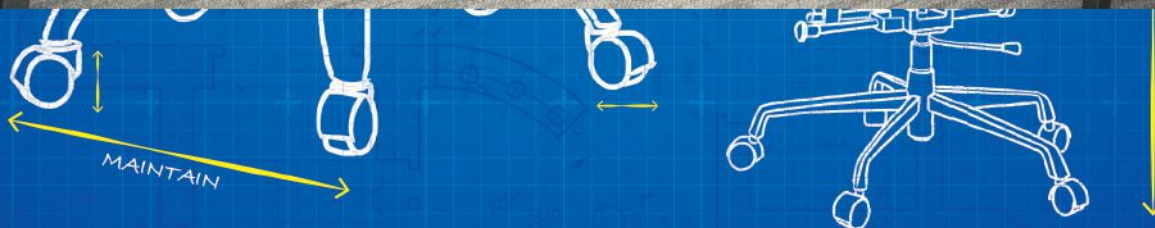
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52 **A SIMPLE EQUATION: APPLYING MATH IN THE WORKPLACE**



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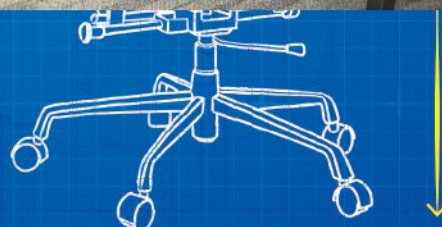
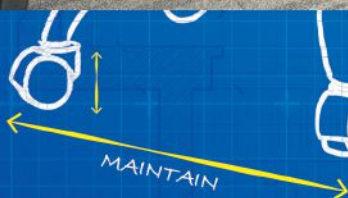
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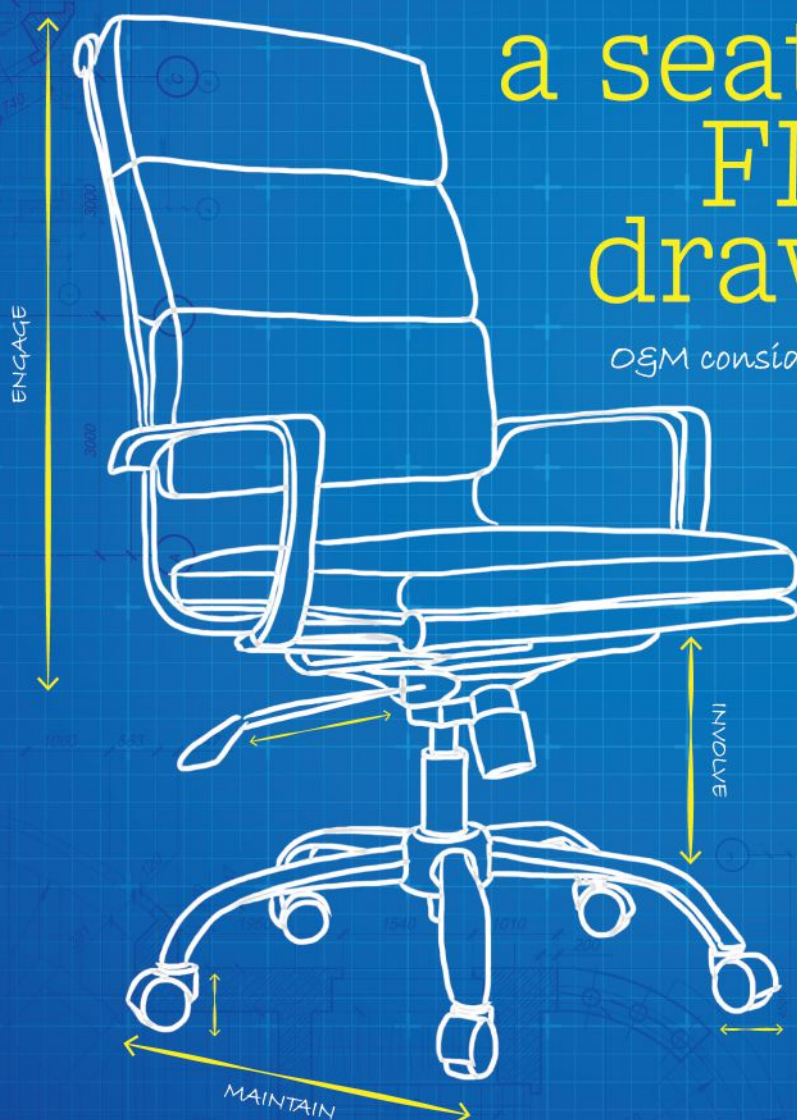


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a seat for FM at the drawing table

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Also inside

22 **ROLE OF DATA IN OPERATIONAL EFFICIENCY**

52 **A SIMPLE EQUATION: APPLYING MATH IN THE WORKPLACE**

NEW



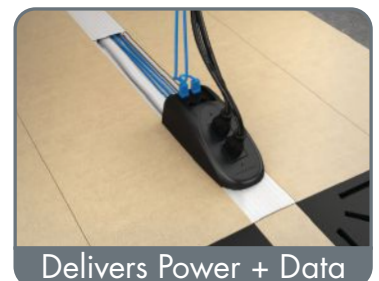
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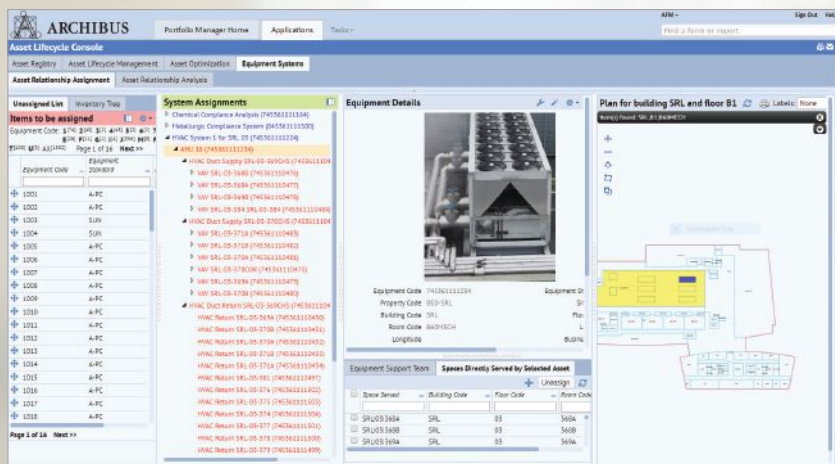
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IN THIS ISSUE OF FMJ ...

MAR / APR / 2017
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BEHIND THE COVER

This issue's conceptual cover represents FM's importance at a project's inception. Blueprints house integral details, and FMs provide key insights — together, they can greatly enhance a project's success.

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ABOUT IFMA IFMA is the world's largest and most widely recognized international association for facility management professionals, supporting 24,000 members in 104 countries. This diverse membership participates in focused component groups equipped to address their unique situations by region (13 chapters), industry (15 councils) and areas of interest (six communities). Together they manage more than 78 billion square feet of property and annually purchase more than US\$526 billion in products and services.

Formed in 1980, IFMA certifies professionals in facility management, conducts research, provides educational programs and produces World Workplace, the world's largest series of facility management conferences and expositions. To join and follow IFMA's social media outlets online, visit the association's LinkedIn, Twitter, Facebook, YouTube and Flickr pages. For more information, visit the IFMA press room or www.ifma.org.



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VOL. 27, NO. 2. 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, Ste. 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. © 2017 International Facility Management Association.

POSTMASTER: Send address changes to: FMJ, 800 Gessner Road, Ste. 900, Houston, TX 77024-4257 USA.

FIND MORE FMJ ONLINE

MAR / APR / 2017
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READ ONLINE AT WWW.IFMA.ORG/FMJ

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



- **ARTICLE:** “Electrical Maintenance for the Win” to accompany “Electrical Systems: Don’t Get Burned” (p. 43)



- **WHITE PAPER:** “Fire Codes: A Foundation of Safety for a Rapidly Changing World” to accompany “Electrical Systems: Don’t Get Burned” (p. 43)



- **BLOG POST:** “What do Bed Bugs Look Like?” to accompany “Bed Bugs in the Workplace? Establish an Action Plan” (p. 63)



- **WHITE PAPER:** “Sell Your Projects with CFO Jargon” to accompany “Speaking the Language” (p. 73)

The online publication includes **FMJ EXTENDED**, a special section following the end of the print magazine that contains additional articles. Navigate in the digital edition to the articles listed below to read contributions from councils and communities, and other supplementary content.

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ON
THE
GO?

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



IN CASE YOU MISSED IT ...

The January/February 2017 issue of FMJ was themed

Workspace as a Tool. Be sure to check out the feature article, **FMS AS WORKPLACE ALLIES** by Mishelle Oun on the crucial contributions of facility management professionals to creating the workplace of the future.

READER FEEDBACK

“I’ve been reading the FMJ for years. Great facility management resource.”

– Gary Perkins, CFM, CFMJ via LinkedIn

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IFMA's FMJ

EDITOR'S COLUMN

Erin Sevitz
Editor



Just as many of you are members of the leading global FM association — IFMA — I'm a member of the organization that represents my profession: the International Association of Business Communicators (IABC). Each week, IABC hosts a Twitter chat on a range of topics relevant to communications trends and best practices, and I try to drop in from time to time. Recently, the discussion centered on the concept of "alternative facts" — not on the political context that has popularized the term in our lexicon, but rather on its implications for those who work in the communications discipline.

Today, communicating — that is, transmitting information among people or devices — is an enormously complicated endeavor. Conveying a message involves more than clarity; it's a question of combatting information overload, navigating innumerable media and speaking in a manner that's both engaging and ethical.

As Tony mentions in his column on page 10, this is something IFMA is continually seeking to improve. We're taking a hard look at both our channels — FMJ, newsletters like The WIRE and Insiders, websites and the Online Community, social media, webinars, videos, phone calls, and face-to-face meetings — and our messaging and delivery. With so much going on at IFMA, it can be challenging to make sure you're getting the information you need.

If you have input on how you'd like to receive updates, we'd love to hear from you. In the meantime, here are some important upcoming dates and deadlines with links (in the online magazine) for more information:

- **March:** Release of updated "Sustainability How-To Guide: Global Green Cleaning" »
- **March:** Technology content featured on Knowledge Library »
- **March 24:** Deadline to apply to present at World Workplace Houston »

- **March 31:** Deadline to submit nominations for the Asia-Pacific Awards of Excellence »
- **April:** Environmental Stewardship and Sustainability content featured on Knowledge Library »
- **April 1-3:** CFM Exam Prep Workshop Plus at Facility Fusion Las Vegas »
- **April 3:** CFM Exam Prep Workshop at Facility Fusion Las Vegas »
- **April 3:** IFMA credential online training materials move to www.fm.training »
- **April 4-6:** Facility Fusion Las Vegas »
- **April 7:** Last day for US\$200 early-bird savings on Facility Fusion Toronto registration »

This issue

This issue, we focus on the core of facility management: operations and maintenance. Our cover feature by Mary Anne Schmitt and James L. Jenkins on operational considerations for mechanical design is particularly timely.

The authors conducted interviews with mechanical engineers on the degree to which operations functionality is incorporated in building design. All participants agreed that, while this is a crucial aspect for project success, the process in most scenarios needs significant improvement.

This is where IFMA's collaboration with RICS comes into play. One of the goals of collaborating is to ensure that FM has a seat at the table in other areas of the built environment conversation — so that, for example, FM has input into design and construction phases. Collaborating with RICS places FM (and IFMA members) in front of professionals across these related disciplines.

Watch your inbox for monthly collaboration updates to learn more.

Erin

STAFF

EDITOR

Erin Sevitz / erin.sevitz@ifma.org

COMMUNICATIONS COORDINATOR

Emily Bennett / emily.bennett@ifma.org

ADVERTISING ACCOUNT SPECIALIST

Diana Maldonado / diana.maldonado@ifma.org

MARKETING

Chablis Lindquist / chablis.lindquist@ifma.org

DESIGNER

Michelle Doe

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P.S. If you're interested to hear what communicators had to say about alternative facts, you can check out the recap at storify.com/iabchq/commchat-alternative-facts.

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LEVEL UP! *To optimize performance, make your FM practice as smart as your buildings*

As an FM professional, making buildings run as efficiently and effectively as possible is what you and your team do all day. But are you doing the same for yourself as a leader?

Challenging yourself to avoid complacency is a key aspect of leadership. In FM, this means using continual process improvement and innovation to optimize your role and your team. In today's fast-paced business environment, transformation and constant change are the new normal. So how do you adapt your leadership style to drive this transformation?

Leave "the box" behind

To paraphrase a Boston Consulting Group speaker at a recent conference I attended, we should no longer simply think outside of the box. Instead, get out of the box altogether, adapt a new framework and look at the work completely differently. Stop letting the status quo shape your thinking.

One simple place to start is by looking at how work gets done. Turn a fresh eye to playbooks, procedures, compliance processes and other foundational activities. Confirm that you, your staff and colleagues are working consistently and compliantly. Do you have a set of standard operating procedures (SOPs) and best practices? Check your onboarding procedures to ensure new hires are aligned from day one.

Be honest with yourself and your organization by looking at industry-wide practices. Look at disruptive industries that may potentially be your new competition. How do you measure up? By benchmarking, you'll take another step in getting out of the box. Online benchmarking tools offer information on nearly every aspect of FM, including industry-specific data. Identify opportunities for improvement and challenge yourself to identify new trends.

What comes next? What can you do differently to improve on what you are already doing? Ask your staff and colleagues to help identify larger goals. Talk to your vendors to see what tools and technologies might be available and applicable to your organization, or in what new ways you could use existing resources.

Forge on toward improvement in these critical areas:

Technology. Not every FM team has the budget or the need for a large CAFM or IWMS implementation. Today's digital FM

tools come in all shapes and sizes to help teams add efficiency, improve compliance and deliver data and insights to inform work. For instance, subscription-based automated work-order systems accessed through the web don't entail a costly capital investment or lengthy implementation. New technologies can generate a healthy return on investment by eliminating manual processes and associated costs. The potential return — in terms of reduced costs, better quality and compliance, and access to data and analytics — provides a business case for change.

Compliance. Whether or not your organization is subject to internal or external audits, compliance with organizational and regulatory standards is a key aspect of FM. CEOs might not realize the impact FM has on this critical success area, but we know how profoundly buildings factor into scoring on ethics, safety, vendors, labor practices, information security, data governance, contracts and financial management. For example, automated IFM tools can track data for reporting, help ensure accuracy and reduce the risk of non-compliance.

Capital planning. When operations and maintenance are not strong, capital planning can become unpredictable and costly. Smart technologies and preventive maintenance not only improve building performance, reduce operating costs and enhance the workplace experience, but also track the data you need for more accurate capital planning.

Reporting. What additional metrics should you be tracking related to your specific industry or facility type? What does senior management consider to be important for advancing the business? If your company is undergoing transformation, look for FM metrics that support organizational change. What measures best portray FM's contribution to the workplace experience and employee engagement? Reports that relate to business priorities will help elevate your role in the eyes of the C-suite.

As always, take advantage of your IFMA membership. Visit the IFMA Knowledge Library to learn about best practices, SOPs and more, contributed by a wide range of subject matter experts.

The best FM outcomes happen when we embrace our leadership roles and communicate them to others. By stepping out of the box of "business as usual," you can boost your effectiveness, improve outcomes and advance your FM practice.

define.fm

www.define.fm



we.define.fm

Join the game-changing global network
that will give you a voice in FM.

The IFMA (International Facility Management Association) and RICS (Royal Institution of Chartered Surveyors) collaboration is aligning standards and professional development for the facility management industry.

Learn more at www.define.fm.



PRESIDENT'S COLUMN

Tony Keane, CAE
President and Chief Executive Officer



Communication today is challenging. All of us are bombarded with far more inputs and requests for attention than what is humanly possible for us to process. Society is moving faster than ever before and organizations worldwide struggle to keep up with the rate of change. IFMA is not exempt from any of these issues.

Over the past year IFMA has placed more emphasis on communication than ever before. Yet at the same time, the bar continues to be raised as to what is required to break through the clutter. We are examining every aspect of our communication infrastructure to make sure we cover all available channels in a way that breaks through the clutter.

Success brings change

This is extremely important today as IFMA continues its journey to increase the awareness of facility management and the credentials associated with FM. FM is being recognized around the world, due largely to the efforts of many associated with IFMA. The initiative over the past 37 years to make this happen is staggering and is what has brought the industry, and IFMA, to their current stature.

However, with success comes change. IFMA is evolving to meet the demands of the profession and the industry. If IFMA does not evolve then it will become irrelevant and other organizations or disciplines will take over what IFMA started.

Sadly, we have seen instances in which members have retired and their duties have been dispersed among others in disciplines such as human resources, administration, etc. We have seen CFMs who have allowed their certification to lapse following a promotion. FM must continue demonstrating strong strategic value as a separate discipline among the stakeholders it serves.

Steps in the right direction

IFMA has deliberately implemented initiatives to enhance awareness of FM and the IFMA credentials, to reach out to the other sectors of the built environment to demonstrate the value of FM, and to enhance the FM membership

community within IFMA. The changes that you see within IFMA are designed to make IFMA stronger, more visible and — most importantly — help us remain relevant within the built environment.

One significant step is the IFMA-RICS collaboration. Since signing the agreement in April 2016 we have accomplished the following benefits impacting IFMA members:

- Increased content access in the IFMA Knowledge Library
- Increased membership to expand the networking base
- Held leadership symposia to discuss the trends and issues facing FM
- Increased awareness of the profession through the define.fm campaign
- IFMA participation in the International Ethics Standards Coalition

There is additional progress underway in the areas of strategic executive level qualification, research projects and increasing the visibility of the CFM certification.

Our leadership envisions an IFMA that is relevant, successful and known as the thought leader in FM and an organization that offers members the solutions and resources necessary to provide value-added services to employers and the industry. Reaching this vision will require all of us to embrace changes within IFMA for the overarching purpose of what the organization's founders set out to accomplish.

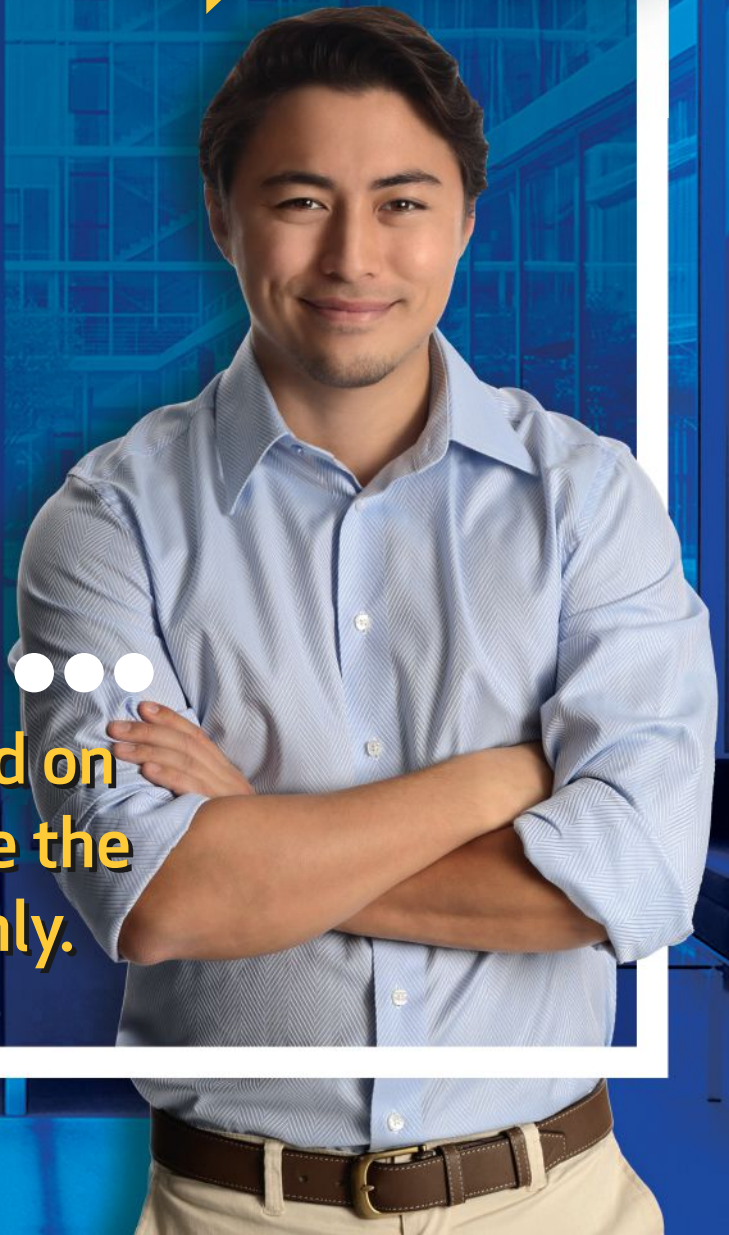
I hope to see you at Facility Fusion in Las Vegas, Nevada, USA on April 4-6, 2017. It will be an educational event with many opportunities for you to network and enhance your leadership skills. Please invite a colleague to join you at an IFMA event in your area. Sharing the membership experience makes it better for all!

Tony

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IFMA, RICS LAUNCH ONE-STOP FM ONLINE TRAINING PLATFORM

In December 2016, the IFMA-RICS collaboration launched a platform that jointly hosts all IFMA and RICS facility management training materials on a single, easy-to-use website. The site, www.fm.training, offers convenient access to a robust catalogue of FM continuing education resources.

Among the benefits of the landmark IFMA-RICS collaboration is the authority of the combined educational and professional development materials offered by the two top FM and built environment

organizations in the world. Site highlights include the popular Essentials of Facility Management series and preparation materials for the Certified Facility Manager® (CFM®) certification, as well as video learning.

Not only are these resources growing in global prestige with more employers asking for proof of skill and experience, but with online education modules, workshops and webinars, earning and maintaining professional recognition is easier than ever before. In addition, the

user-friendly fm.training platform allows students to drill down to see the details of their progress in each course, and learning materials can be purchased in four currencies (USD, CAD, GBP and EUR).

A world-class FM training program is a key part of how IFMA and RICS are enabling the FM industry to accomplish global unification and increased representation at all stages of the building life cycle. For more information on the IFMA-RICS collaboration, visit www.define.fm.

IFMA O&M benchmarking survey to update FM industry benchmarks



IFMA and the FM Research and Benchmarking Institute (RBI) launched a new operations and maintenance (O&M) benchmarking survey on Feb. 13, 2017. The survey data will be used to update the association's bestselling benchmarks report, IFMA Operations and Maintenance Benchmarks Research Report #32. The new report will focus on the North American market.

The IFMA O&M benchmarking survey mirrors the existing IFMA Operations and Maintenance Benchmarks Research Report #32 and includes:

- new questions on security and technology;
- new questions on FM-related software types and usage; and
- FM questions on organizational processes.

Direct inquiries to IFMA's Benchmarking and Analytics Manager Nickalos Rocha at nickalos.rocha@ifma.org.

NOMINATIONS OPEN FOR 2017 IFMA AWARDS OF EXCELLENCE

IFMA's annual Awards of Excellence recognize the outstanding achievements of members, chapters, councils and partners



of the association. Covering 16 different categories, IFMA's Awards of Excellence are judged by panels comprised of industry experts evaluating nominees individually and scoring them in several specific areas.

Nominations for IFMA's 2017 Awards of Excellence opened Feb. 10, 2017 and will close May 26, 2017. The awards will be presented at IFMA's World Workplace 2017 Conference and Expo in Houston, Texas, USA. Access the full list of 2017 award categories, review judging opportunities and nomination instructions or read the full list of 2016 awards winners at awards.ifma.org.

UPCOMING FM EVENTS

WORLD WORKPLACE ASIA CONFERENCE AND EXPO

9-10 May, 2017

Hong Kong, Hong Kong
worldworkplace.ifma.org/asia

WORLD FM WEEK

15-19 May, 2017

Worldwide
bit.ly/WFMD2017

FACILITY FUSION CANADA CONFERENCE AND EXPO

May 17-18, 2017

Toronto, Ontario, Canada
facilityfusion.ifma.org/toronto

WORLD WORKPLACE FORUM MIDDLE EAST

18 May, 2017

Dubai, United Arab Emirates
worldworkplaceme.org

WORLD WORKPLACE EUROPE CONFERENCE AND EXPO

30 May-1 June, 2017

Stockholm, Sweden
worldworkplaceeurope.org

Celebrating worldwide building safety, success this May

Organizations like IFMA, RICS, Global FM and many others promote the importance of strategic building design, construction and management year-round. But this May, industry professionals and organizations from around the globe will be united in observance of two celebrations planned to endorse and elevate the vital role of the built environment and those who protect and maintain it.

ICC promotes awareness through 37th annual Building Safety Month

The International Code Council Family of Companies' (ICC) theme for 2017 Building Safety Month, the 37th annual worldwide public safety campaign celebrated in May, is "Code Officials: Partners in Community Safety and Economic Growth."

During May, ICC's 60,000-plus members, along with other professionals in the construction and design community, will conduct events and implement proclamation signing ceremonies to increase awareness about the importance of building and remodeling to modern codes and standards.

For information on ICC's Building Safety Month, visit www.iccsafe.org/about-icc/building-safety-month/2017-building-safety-month.



Global FM invites FM community to celebrate World FM Day 2017

Global FM, the alliance for facility management associations worldwide, has announced 17 May, 2017 as the date for the next World FM Day, occurring during the World FM Week celebrations held 15-19 May. Each year, World FM Day showcases the vital work FM professionals and the FM sector contribute to businesses worldwide while also raising the profile of the FM profession.

World FM Day provides an opportunity for global knowledge sharing, to discuss and share experiences both good and challenging, to promote the profession and celebrate FM successes. The 2017 theme, "Enabling Positive Experiences," will highlight how facility management plays an integral role in positive customer, client and employee experiences in all sectors.

Watch <http://bit.ly/WFMD2017> for full details of World FM Day 2017 celebrations as they are announced.

RECENT ACQUISITIONS

ISS Group, a Gold-level Corporate Sustaining Partner of IFMA, has acquired Nordic workspace management and design consultancy Signal. Signal advises on the use of strategic space management and workplace design to improve performance, and has an approximate annual revenue of DKK 30 million (£3.5 million). Signal will remain a separate business unit within the ISS Group and will continue to be led by the current leadership.

Facility Engineering Associates, P.C. (FEA), a Corporate Sustaining Partner of IFMA, has acquired security consulting firm RETA Security. RETA Security assists school administrators with independent physical security consulting services, including assessments, training and emergency planning. The firms have combined to offer their clients world class facility security consulting as part of FEA's suite of total asset management consulting services.

HAVE RELEVANT FM INDUSTRY NEWS TO SHARE?

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NEW INDUSTRY PUBLICATIONS

CBRE releases 2017 Asia Pacific Real Estate Market Outlook report

Investors will continue to retain a strong interest in Asia Pacific commercial real estate in 2017, owing to a low interest rate environment and supportive longer-term regional macroeconomic fundamentals. However, overall investment activity will likely be influenced by tight pricing and limited availability of investable stock, per CBRE's 2017 Asia Pacific Real Estate Market Outlook report.

According to CBRE, investors in the Asia-Pacific region will be more creative this year when formulating their investment strategies in order to achieve target returns. Potential strategies employed by investors will include adding value by asset repositioning or asset enhancement of existing properties with lifestyle amenities and services.

- Investors with a stronger appetite for risk will **seek opportunities outside gateway cities** in locations offering attractive pricing.
- The low yield environment will continue to encourage investors to **seek opportunities outside conventional asset classes** and take advantage of new demand resulting from changes in consumer behavior.
- Global economic uncertainty has resulted in occupiers focusing on **portfolio optimization**.
- Softening demand and new supply will drive an emphasis on **placemaking** and prompt proprietors to be more creative and proactive in managing their tenant community. Building owners will design and manage their properties and surrounding areas to create a distinct identity to attract and retain tenants. Technology will be leveraged to better understand building usage and tenant requirements, as well

as improving the connectivity among building users.

Learn more about the "2017 Asia Pacific Real Estate Market Outlook" report at www.cbre.com/research-and-reports/apac-real-estate-market-outlook-2017.

NIBS unveils National BIM Guide for Owners

Following a year-long development process, the U.S.-based National Institute of Building Sciences (NIBS) released its new guideline to help building owners utilize building information modeling (BIM). The National BIM Guide for Owners (NBGO) provides building owners with an approach, from their own profession's standpoint, to create and fulfill BIM requirements for a typical project. The 36-page NBGO addresses three broad areas the owner should understand to work effectively with the project BIM team: process; infrastructure and standards; and execution.

The guide provides building owners with a documented process and procedure for their design teams to follow to produce a standard set of BIM documents during the design and construction of the facility, and for maintenance and operations of the facility upon handoff. Establishing the criteria, specifications and expectations in the design and construction process will help owners capture the full value of investing in BIM, while providing a uniform approach for institutional and commercial building owners to achieve consistent BIM requirements for their facilities.

The new guideline, which is based on a number of foreign, federal, state and local BIM guides that already exist, is geared to a generic facility with uniform requirements for use by a variety of government, institutional and commercial

building owners. It references a range of documents and practices, including those contained within the National BIM Standard-United States®. Access the free guide at www.nibs.org/page/nbgo_form.

NCGBCS white paper examines role of existing US building codes

The National Institute of Building Sciences National Council of Governments on Building Codes and Standards (NCGBCS) announces a white paper focused on one of its key priorities, "The Role of Existing Building Codes in Safely, Cost-Effectively Transforming the Nation's Building Stock."

Existing buildings define the main streets and skylines of American communities. Yet, as these communities evolve to address changes in their economy and populations, they don't always have the mechanisms in place to assure the safety and security of their citizens while providing building owners and developers a cost-effective means for updating the existing building stock to meet changing needs. Existing building codes provide just such a mechanism.

In this white paper, the NCGBCS, in its effort to support high-performance buildings and communities, examines effective strategies for promoting the adoption of existing building codes, as well as developing and implementing educational and training programs for owners, builders, contractors, design professionals and, most importantly, code enforcers. NCGBCS also addresses some of the implementation challenges and enforcement issues, and the technical changes necessary to improve future editions of the codes. Access the free whitepaper at <http://bit.ly/2knR7zl>.

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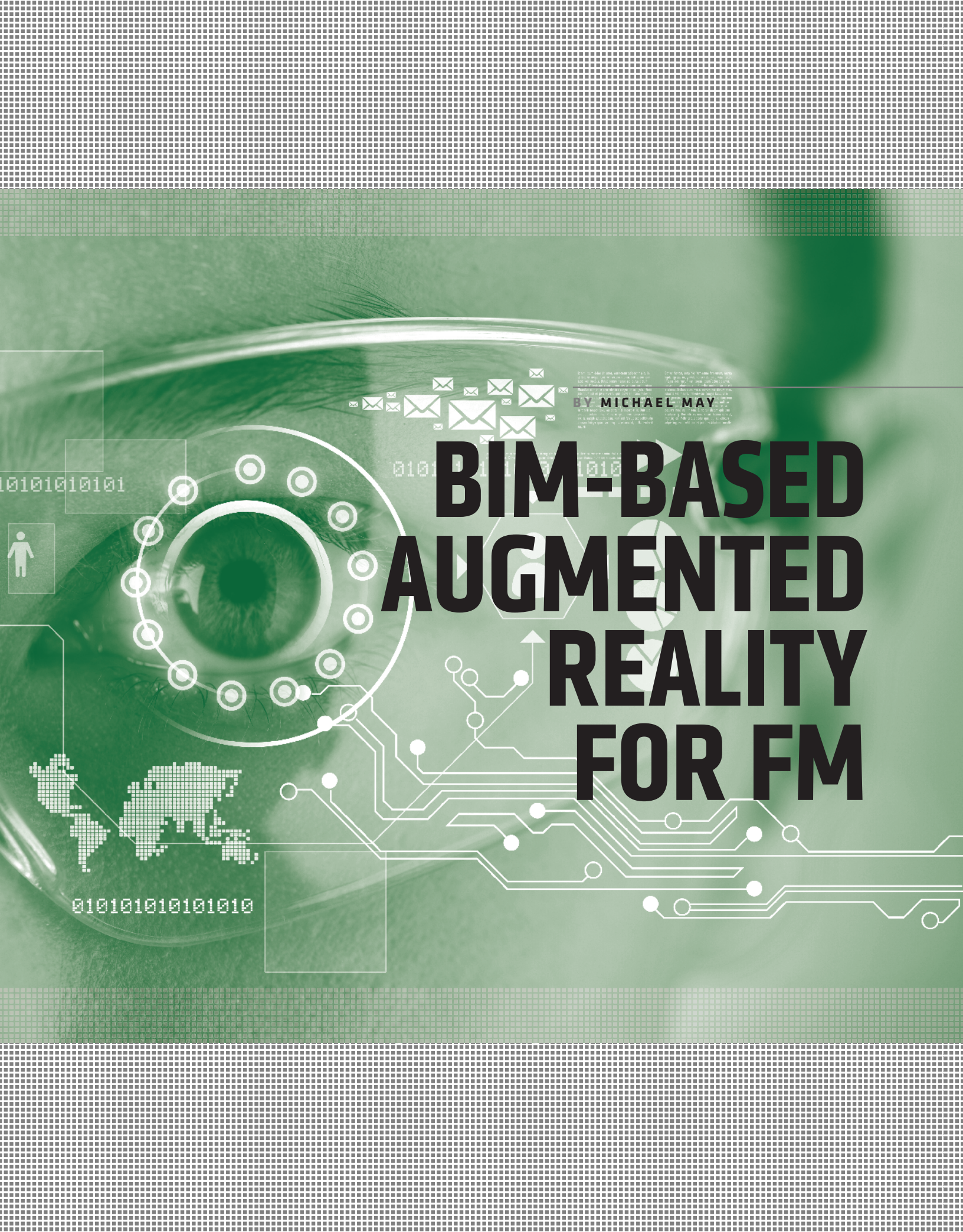
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BY MICHAEL MAY

BIM-BASED AUGMENTED REALITY FOR FM

Facility and maintenance management processes require informed decisions on an organization's real estate portfolio and related equipment in real time onsite. Too often, documents, images and instructions are not available or not up-to-date, which results in unnecessary effort, wasted resources and poor decision making. This can lead to delays, financial loss or even health hazards.

Fortunately, augmented reality (AR) is one of the essential digitization technologies that can be exploited in some of those cases.¹ With AR, FMs can integrate virtual objects into real, three-dimensional environments to visualize the possible outcomes. These models are frequently derived from building information modeling (BIM) by using BIM authoring tools.

So, what is the role of AR technology in facility and maintenance management? To examine this, let's look at the outcome of an AR research project titled, "FMstar – Facility Management by Semantic Technologies and Augmented Reality." It considers the application of AR to maintenance of technical equipment. The focus is not only on AR, but also on modeling virtual objects with BIM and representing knowledge by means of semantic technologies.

AUGMENTED REALITY

Whereas virtual reality (VR) is now widely understood, the potential of AR is less well known. Even though AR is a well-established discipline in industrial processes, there are only few applications in facility and maintenance management.

The literature lists different starting points of AR development.² In the late 1950s, Mort Heilig invented the Sensorama simulator, which could combine three-dimensional movies, stereo sound, mechanical vibrations, fan-blown air and aromas. In 1965, Ian Sutherland established the

fundamentals of VR, describing an ultimate display predicting interaction with the virtual environment. Based on this idea, the first functioning head-mounted display (HMD) was presented in 1968. Videoplace, created by Myron Krueger in 1975, was the first environment that enabled users to interact with virtual objects.

With the rapid advances in computer graphics, hardware and software, interest in AR — from both a research and application perspective — increased in the early 1990s. The mid-1990s saw the first surveys on AR, which considered not only the technology but also applications.

In contrast to VR, AR allows users to see the real world with virtual objects superimposed. AR challenges include interaction in real time, recognition, and tracking and positioning (rendering) of virtual objects, as well as matching (registration) of physical objects with their virtual counterparts.

Some experts consider AR the next big technology megatrend which will make devices such as monitors, smartphones, keyboards and mice redundant in the next three to 10 years.

Technology

Tracking means continually locating the user's viewpoint described by position and/or orientation. Tracking is divided into active, passive and hybrid technologies due to the inherent measuring principles. They differ in effort, accuracy, precision and cost. AR frequently combines these different technologies.

With passive tracking, no equipment needs to be mounted on the object that is to be detected. Object recognition and identification needs to be implemented by the sensing device. In practice, such systems are very user-friendly. However, accurate passive sensing requires powerful and expensive equipment with complex software for the sensing device.

Active sensors involve an identification item (such as a marker) placed on the object that needs to be tracked. This makes tracking easier, but the items must be placed on all relevant objects. Hybrid systems combine multiple types of sensors and thus compensate for the disadvantages of individual sensor types. For example, global positioning (GPS) can be combined with inertia systems that temporarily track the motion of objects when no satellite connection is available.

Compared to sensors for VR, sensors for AR require a higher accuracy and greater range since they may also be used outdoors. Frequently, maintenance and repair of technical equipment must be performed in places where technologies like Wi-Fi or GPS are not available or give inaccurate tracking results. For this reason, marker-based approaches as chosen in FMstar provide an alternative.

AR applications are built on hardware with components such as processors, displays, sensors and input devices. Contemporary mobile devices are usually equipped with a camera and various sensors such as an accelerometer, GPS and solid-state compass.

Interacting with an AR application requires an adequate input device. AR interfaces are combined of physical components, display elements including visual and audio, as well as interaction principles. Ideally, the virtual and real content should be directly displayed in the user's eyes. AR is not limited to the sense of sight and could potentially apply to any of the senses, including hearing, touch and smell.

Among the devices used in AR are: displays, handhelds, projectors, heads-up or head-mounted displays, smart glasses, contact lenses and retinal displays.

BIM model generation for AR

Computer-generated geometric models of buildings and equipment can be derived from several different sources. Traditionally, 3-D computer-aided design systems were used to generate the virtual models needed for AR applications.

With the advent of BIM, more and more building and component models are generated by BIM authoring tools. Depending on a closed or open BIM approach, proprietary data formats like Revit (rvt) or internationally standardized open formats like Industry Foundation Classes (IFC) are used, which is especially useful if an application must remain compatible with various software providers.

Consequently, in the FMstar project virtual models were generated by a BIM authoring tool and further processed relying on the IFC format. One of the project partners was able to provide a complete factory model.

AR applications

AR can be utilized in many everyday situations by improving communication, interaction and learning experiences. Most applications can be found in fields such as industrial, medicine, military, design, construction, architecture, maintenance and repair, tourism, culture and media, simulation, visualization, advertising, navigation, collaboration, education and “edutainment,” or gaming.

AR applications can be provided in a static, web-based or mobile environment. From a facility and real estate management perspective, mobile AR (MAR) is of particular interest.

DOMAIN MODELING

One of the most interesting questions is how to model and represent relevant knowledge about building components and technical equipment. Computer-aided facility management (CAFM), integrated workplace management system (IWMS) or enterprise resource planning (ERP) systems usually model information in databases that use interrelated tables. This is not always a very natural way of modeling facts about our environment. Consequently, semantic technologies and NoSQL databases have been developed. In FMstar the paradigm of semantic modeling was used.

Ontologies are a core concept for the utilization of semantic technologies for formal knowledge representation of a specific domain. Domain ontologies contain the relevant and useful concepts and knowledge for a specific application field. Another important feature of ontologies is their technical suitability for reasoning. With rules, not only the representation of knowledge but also the generation of new facts in an ontology-enabled knowledge base can be realized.³

FMSTAR

Objectives and tasks

The German Ministry of Economic Affairs and Energy supported the project from April 2013 to October 2015. The research project FMstar with contributions from three universities and four subject matter experts aimed at supporting complex FM processes by connecting the real world to virtual models and context-based information with the help of AR.

The relevant tasks were:

- Analysis of maintenance and approval processes
- Analysis of AR methods and mobile technologies and their integration in maintenance management
- Analysis of semantic technologies aiming at context-based modeling of information
- Requirements specification



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- Design of system architecture
- Development of the FMstar app (based on the Android platform)
- Integration with an IWMS
- Test and evaluation of the prototype system

Shortcomings

Surveys and interviews have shown that technical documents are generated in large amounts during the life cycle of a maintenance object and that they are very often unstructured and paper-based. Those documents contain information on removed technical parts, changes and additions without chronological order. Often, changes are documented not properly or by handwritten notes only.

Technical documentation is kept at the maintenance objects whereas business information like accounting data is kept somewhere else, such as a CMMS or IWMS.¹ Hence, there is no straightforward way to review all available information at the same time onsite. Fast, reliable, location-independent and proper presentation of complete, up-to-date and consistent information is mandatory.

Users were asked about the usability of mobile maintenance-supporting IT systems, as accessing digital information often is too cumbersome. When consulted, FM experts confirmed that they consider using digital assistants to be inconvenient.

The lack of intuitively understandable presentation of context-based data on mobile devices is still a barrier for their practical use.

System architecture

FMstar was designed to work on a multi-tier software architecture (figure 1). Graphical and textual data is provided by various sources (e.g., BIM, CAFM/IWMS and ERP systems). Import plugins read Industry Foundation Classes (IFC) model data into a 3-D database, while FM object and process data is imported into a semantic database.

The system can handle context-based information and presentations such as the position of the mobile device, the physical environment, the operator's qualification, assigned tasks or required documents.² It can process navigation, work orders and documentation. In addition, the operator can walk through a virtual 3-D model, select and identify objects (e.g., by QR codes), and display and edit technical data, documents, images, etc. Furthermore, the operators can use the AR technology to register the 3-D model with the position of the real object. This means they can select technical components in the real world and display related information.

To demonstrate the integration of FMstar with other IT systems the FMstar app was coupled with an IWMS system.

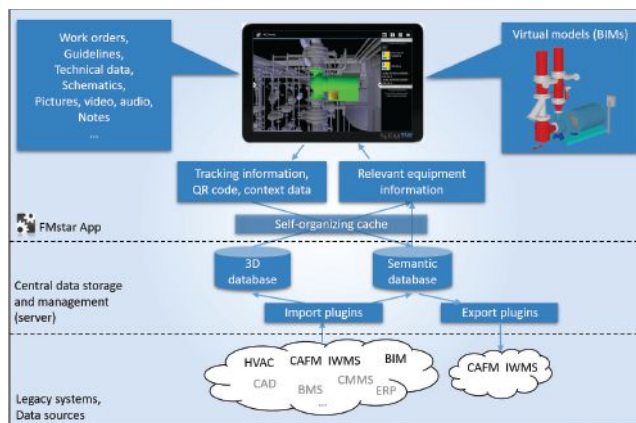


FIGURE 1 (top)
FMstar system architecture

FIGURE 2
FMstar app with highlighted component and related information

The FMstar app

FMstar stores 3-D models based on IFC data in a database. When the prototypes' operator opens the model, he or she can immerse into and explore it. The operator can investigate highlighted objects, (e.g., objects with open tasks) and select any part of the model. Tapping on an object displays additional information.

To achieve an AR view the FMstar app uses the device's camera and motion sensors. For the optical tracking, the system uses a QR marker-based system that detects square markers (golden square in figure 2) from an image captured by the camera. Then the pose and position of the marker is estimated and the virtual object is displayed on the marker's coordinates.

When the operator clicks on a real-world object on the display, the device recognizes the corresponding virtual model and highlights the object. The model follows the movements of the device, thus being always at the correct position. Related data can be displayed or new data (e.g., images, audio files or textual notes) can be attached to the selected object. Consequently, the system achieves an intuitive combination of real-world objects and related digital data.

FINAL THOUGHTS

Augmented reality is an essential digitization technology with considerable potential in facility and maintenance management. Adoption of this technology depends on the usability of mobile devices and apps as well as the reliability of methods such as tracking and rendering. AR applications are based on the availability of data and information related to the business processes under consideration. Semantic technologies provide an innovative way of modeling context-based information. BIM models can be utilized to meet the visualization requirements involved in an AR system.

AR technology is expected to support a large variety of FM-related tasks such as workplace management, facility services as well as business continuity. Together with gaming technology, AR is poised to facilitate knowledge transfer in FM. **FMJ**

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MICHAEL MAY, Ph.D., is a professor of computer sciences and facility management at the University of Applied Sciences (HTW) Berlin since 1994. He is a board member of the German Facility Management Association (GEFMA) and head of GEFMA's special interest group (SIG) on IT. He represents GEFMA at the international level via groups such as IFMA and EuroFM. His current research and lecturing is in the field of IT and FM.

Together with Geoff Williams he is the editor of the new second edition of "The Facility Manager's Guide to Information Technology" — the result of an international collaboration between GEFMA's SIG on IT/FM and IFMA's IT Community.



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ROLE OF

DATA

IN OPERATIONAL

EFFICIENCY

BY NICHOLAS MIRISIS

Transparency and accountability, combined with the pressure to produce and perform more efficiently, are realities that organizations across every industry are facing more than ever today. As demands have increased, so has a reliance on technology solutions specifically designed to meet them.

In the world of facility management, that's meant turning to cloud-based operations management software as the standard for optimizing operations and workflow.

As the technology transformation has evolved and become a linchpin for successful operations management, another reality has come with it — a deluge of data. But greater demand for increasingly granular analysis and reporting means that individuals from all levels of operations and maintenance management are starting to use data in a more insightful and actionable way. The timing is right, as data can help enable facility professionals to streamline, automate, control, audit and improve operations.

BUSINESS INTELLIGENCE: TAKING DATA TO THE NEXT LEVEL

In recent years, organizations have begun looking for ways to leverage data even further. As systems, sensors and the Internet of Things churn out more metrics, leaders are increasingly turning to business intelligence tools to not only generate data, but to help transform that data into consistent processes.

Operations software systems enable facility managers to gather, sort and analyze data for insights about what happened in the past. Business intelligence applications within those systems then leverage data across the enterprise, helping to connect it in meaningful ways that facilitate business analysis and improve best practices. With reporting and analysis tools, business intelligence gives organizations greater insight into operational metrics and provides answers to questions such as:

- What's working?
- What isn't?
- Where are inefficiencies to weed out?
- Where are efficiencies to replicate?
- What are the correlations between business processes and outcomes?

Using visual tools such as dashboards, spreadsheets and charts, business intelligence applications make data easier to analyze, understand and use to make better decisions. Many platforms offer access to an enterprise-level view of data in real time for executive management, equipping them to develop programs and processes more efficiently and accurately.

The continuing transformation of facility management data through business intelligence is one in which information becomes knowledge, and that knowledge can then be used to drive improvements across the business. A mandate to achieve greater efficiencies runs throughout organizations, which means employees at all levels are increasingly turning to data to show they're complying with regulations and being good stewards of taxpayer and corporate funds. This type of data is also key for justifying staffing levels and capital investments as well as improving operational efficiencies and identifying under- or over-performing operations.

Leveraging business intelligence metrics helps strengthen organizations' long game, too. Data helps future-proof organizations by enabling them to play offense against oncoming trends that threaten to impact operational efficiency and production.

One trend facility managers are facing is a projected decline in operations professionals in the workforce. Over the next 10 years, the Sloan Center on Aging and Work says more than 50 percent of facility management personnel will retire. On top of that, fewer students are earning facility management accredited degrees. To combat this reality, data-driven analysis can drive better FM decision-making and greater efficiency through automation, despite declining resources.

KPIs: THE TOOL FOR DATA-DRIVEN DECISIONS

Business intelligence, however, is only as accurate, effective and useful as the data upon which it's built. Key performance indicators (KPIs) hone in on metrics that will provide the answers management needs to make critical business decisions.

KPIs are navigational tools that measure how well an organization is doing against strategic goals and objectives and can vary, depending on organizational goals. The most effective KPIs target areas that will make the most impact in an organization. Because facility management systems compile data from different departments and systems across the enterprise, they streamline and simplify the development and tracking of KPIs.

As an example, one of the top KPIs for facility managers is typically the ratio of preventive work orders to all proactive and reactive work orders. This is important to monitor as a preventive maintenance program can reduce catastrophic failures by 60 percent and decrease cost of work orders by 30-40 percent on average.

Another critical KPI is work hours per employee per week. Knowing the true "wrench-turning time" can help reveal ways to increase productivity and opportunities for improvement in tracking time — such as going mobile so technicians can access facility management systems on their smartphones or tablets. It may also identify and justify the need for additional maintenance resources.

One KPI that frequently rises to C-level attention is the current replacement value and facility condition index. These data points show how much it would cost to replace the facilities in their current state and the percentage of the current replacement value that needs repair/replacement. This helps prioritize spending and informs capital planning.

USING BUSINESS INTELLIGENCE TO GRADE PERFORMANCE

With facility management software systems automating KPIs, monitoring performance can easily slide into an organization's daily workflow.

A chief operations officer at a 19,000-student school district in central Colorado says that's what happened when they turned to business intelligence data to improve operations. The operations team meets daily to review KPIs, determine focus and assess progress toward goals. Generating reports and graphs using real-time metrics helps them pay attention to details that give them an accurate picture of performance. Tracking daily progress equips them to take action and make improvements quickly.

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For example, with schools increasingly dependent on technology, pinpointing an IT issue becomes a priority when teachers don't have access to the tools they need to do their jobs. KPIs have enabled them to watch for trends in how long it takes to resolve IT issues. Addressing them quickly improves efficiencies within IT, while at the same time, reducing instructional down time.

LEVERAGING KPIS WITH BENCHMARKING

It's clear that KPIs give organizations insights that can help improve their operational performance. But organizations risk tunnel vision if comparison and analysis don't go beyond their walls. Based on results of a recent survey, building owners and facility managers see the value of broadening their view. More than 80 percent of the respondents said that benchmarking their organization's efficiencies against peers or competitors was important.

Benchmarking performance against peers provides a deeper and wider level of analysis that enables organizations to optimize efficiencies even further. Comparing at a macro level, such as the overall energy efficiency of a facility, for instance, or down to a micro level, such as the life cycle of a heating, ventilation and air conditioning system component, peer-to-peer benchmarking capabilities help organizations:

- Compare performance against facilities of similar size and industry
- Identify operational efficiencies in similar organizations
- Spot trends
- Leverage best practices other facilities in their industry are using to achieve results

As an example, for a large health care system that has multiple buildings and campuses, peer-to-peer benchmarking can help executives see a more enterprise-level view of how its facilities are performing and make decisions about implementing overarching best practices. For a state department of education, benchmarking can reveal how capital and maintenance funds are being used at the local level, help prioritize future funding and even demonstrate need at a federal level.

Benchmarking has become an important tool for the Colorado school district. Comparing data at a micro level enables them to measure how they stack up against other school districts. Benchmarking against districts on a state, regional and national level gives them access to a wider swath of data and peer-to-peer best practices to compare against and learn from. Through access to data from schools from across the country, they can see that they rank in the top 20 percent of institutions nationally

in facilities and operations. Benchmarking gives them a framework as they work toward their goal to continually improve to rank in the top 10 percent.

Benchmarking also enables organizations to identify gaps — Are there metrics not being measured that should be? — and assess KPIs — Are the metrics that matter most being targeted when it comes to measuring operational effectiveness and fulfilling organizational objectives? When it comes to justifying budgets and staffing in an environment that demands doing more for less, benchmarking allows facility managers to highlight successes, which helps clear a path to getting what they need to improve operational efficiencies.

BUSINESS INTELLIGENCE PROMOTES TEAMWORK

Business intelligence also promotes a team approach to improvement. When the Colorado school district operations officer began including data-driven recommendations in his operational reports, the financial and educational officers soon followed suit. What began as a push for improvement in facility operations has expanded across all areas of administration, with KPIs and benchmarking becoming part of the culture. Business intelligence helps build partnerships focused on achieving improvements for the entire organization.

At its core, data gets people talking. It solidifies opinions, identifies trends and justifies expenses. When presented with accessible and easy-to-understand data and analysis, key decision makers are more likely to talk about what's being measured, what's not and should be, and how to best achieve operational goals. Optimizing operational efficiencies today is about not just tracking operations more effectively, but using the resulting data for internal and peer-to-peer benchmarking — all with an eye on making more strategic data-driven decisions and plans. **FMJ**



NICHOLAS MIRISIS serves as the vice president of marketing for Dude Solutions (www.dudesolutions.com), the largest operations management software company in the U.S. dedicated to the education, government, health care and manufacturing industries.

He has 15 years of technology marketing and facility management experience, including leadership roles in a start-up that has grown into a high-growth, capitalized cloud company. Mirisis currently serves on the Board of Directors for the National Business Officers Association and the Consortium for School Networking.

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WAYS TO OPTIMIZE YOUR FM WORKFORCE WITH TECHNOLOGY

BY MIKE STONE

With financial constraints impacting facility operations, managers face decisions about how to maximize their workforce and make the most of all resources. Rather than focusing on more long-term capital investment, the key is to get the most efficiency out of existing workers, assets and systems.

An effective asset management strategy is built on visibility into the whole enterprise — each facility or asset's location, condition and maintenance records. Knowing the big picture, and whether you'll be repairing or replacing, makes budget planning easier and helps steadily reduce the repair backlog and associated liabilities.

Technology can help, especially asset management software that is offered as a cloud-based subscription, making it an operational expense instead of a capital outlay. These systems can uncover small but powerful cost and time savings in multiple areas that add up to major efficiency gains. Technology can help increase efficiency in five specific areas:

1 AUTOMATED CALL CENTER SUPPORT. Call centers — especially in organizations with high volumes of incoming calls like local governments, airports and universities — operate as triage points. Doing everything you can to help your customer service team efficiently and quickly answer questions and solve problems is a big factor in keeping customers and constituents satisfied.

Software with a built-in advanced delivery matrix, for example, can quickly identify the best-qualified contractor to solve the problem, based on service codes, geography and other factors. Especially in multi-building situations such as campuses, having an automated delivery matrix instead of requiring call center personnel to research options helps get problems resolved more quickly.

2 DIGITAL CONTRACTORS' PORTAL. Contractors may make up a significant percentage of your workforce. One of the keys to greater efficiency is having a digital platform that allows you to communicate electronically with them and speed

resolution of open issues by sending and receiving work orders, estimates and contracts. Establishing a secure access point for contractors allows them to send and receive updates, and provide estimates, notes and other details as required. This improves efficiency and reduces overall time to work completion.

3 AUTOMATICALLY ISSUE PREVENTIVE MAINTENANCE WORK ORDERS. Running at peak efficiency first requires that you define your preventive maintenance schedule, whether based on suggested time intervals, specifications or condition-based monitoring. Once that's done, technology can help by automatically issuing work orders triggered by the criteria you've selected — and in the process, eliminate spreadsheets, extend asset life and preserve equipment warranties.

4 SPACE PLANNING AND MOVE MANAGEMENT. By making the most of available space and ensuring that large-scale moves are well planned, FM teams can maximize

efficiency. Technology can help you make better use of space and time through visualization of space assignments in which you can define, assign and track employee workspaces and furnishings. This allows you to more effectively plan and execute moves involving multiple employees. You can also integrate workspace management with call center operations, key management and locks for even greater control.

5 CASE MANAGEMENT. Not everything you need to track is contained within the work order process. Sometimes there are accidents, spills, emissions, operator or shift notes, and other items that need to be captured even if no work order is issued. Case management allows you to record events that require ongoing observation and review. Selecting a platform with a built-in case management workflow means you can automatically assign tasks and include the necessary forms and instructions. This establishes an audit log of the case or incident so you can create workflow tasks or follow-up work orders related to the existing case.

Taking the time to analyze and rank your assets can save time and improve efficiency by helping you prioritize work to focus on the most important assets first. Planning work — including specifying parts, tools, instructions, safety procedures and personal protective equipment, and identifying any permits required — can significantly reduce the time for needed repairs while ensuring personnel safety and minimizing rework.

Being more strategic with maintenance is critical. Using technology to intervene at planned points for maintenance and repair will result in more efficient workforce scheduling and reduce long-term costs. **FMJ**



MIKE STONE is product manager of enterprise asset management (EAM) with Infor, a Silver-level Corporate Sustaining Partner of IFMA, and has more than 30 years of experience working with EAM systems. He has led product management, development and marketing for several commercial EAM systems, and has applied EAM technology to a variety of industries, including facility management, oil and gas, chemicals and petrochemicals, food and beverage, mining and metals, manufacturing, and water and wastewater.



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O&M considerations for mechanical design

BY MARY ANNE SCHMITT AND JAMES L. JENKINS

The process of a construction project can be painful for facility managers. It's always surprising how at the end of the project, after the endless design reviews, construction meetings and change orders, there can still be issues with brand-new buildings. Sometimes, it can feel as though no consideration was given to the needs of the operations or maintenance at all.

A recent research project addressed this topic by conducting interviews among mechanical engineers about maintenance and operations considerations in their designs. The interviewees came from a wide range of backgrounds and experiences in mechanical engineering and the building industry throughout Southern California. Through these interviews, the researchers found that there were common themes among the responses. These themes could help to identify potential improvements in the construction planning process for all parties involved.

INTERVIEW RESULTS

The researchers interviewed four mechanical engineering professionals using a set of eight questions about including operations and maintenance items in their projects.

All interviewees agreed that maintenance is an important consideration in all mechanical designs. However, answers about where maintenance falls in terms of importance in the entire design varied among those who were interviewed, mostly because it depends on the project. Mechanical engineers must ensure their designs comply with local codes, space constraints, architects' visions, project budgets and clients' wishes, along with operations and maintenance considerations.

The interviewees also agreed that it varies from project to project as to when the facilities and maintenance teams become involved in the project and that it is preferable to engage them earlier in the project — as early as the schematic design phase. Facilities teams can offer recommendations based on past experiences or insight to existing building systems, and if they are not involved until the construction phases, then suggestions they make could result in costly changes that could have been avoided if they had been known in the beginning of the project.

Additionally, most interviewees agreed that they do not often return to the jobsite after the project is completed. There usually is a warranty period for a year after construction is completed during which engineers return if there appear to be issues with the design, but other than that they do not visit the site. When asked about the process of including operations and maintenance considerations in their designs, the mechanical engineers who were interviewed agreed that it could be improved.

On the part of end users, it is important to communicate needs clearly throughout the project and that they involve their facilities team at the earliest stages of the design. For designers, it's important to gain more practical experience in the field with layouts that have been implemented, and to understand the finer details of how systems are actually built and maintained instead of only viewing them on paper.

O&M CONSIDERATIONS DURING DESIGN

Maintenance and operations is always a consideration for mechanical engineers in project designs.

During the interviews conducted, when asked if the considerations were different between tenant improvement jobs in existing facilities versus ground-up

construction, professionals agreed that the maintenance considerations would essentially be the same. The only difference would be whether there was an existing facilities team with which to discuss maintenance and operations items. In projects for developers or in new buildings where a facilities team hasn't yet been established, mechanical engineers incorporate maintenance items into their designs based on past experiences and best practices.

One of the main items that mechanical engineers consider during design is equipment access, so that the facilities personnel can perform maintenance on the installed systems. However, while consultants will outline certain needs of a system, such as access areas, pipe sizing or power requirements, the fine details are not always outlined specifically in the drawings and can be left up to the contractor to determine.

Even when the engineers outline small details — such as piping or power routing — the information may occur in multiple different drawings (mechanical, electrical, plumbing) which have not been coordinated in a three-dimensional model to show any obstructions or clashes between systems. After conduits, sprinklers and other mechanical piping systems are installed throughout the building, the maintenance access space that was planned may no longer exist.

Additionally, mechanical engineers consider maintenance factors when they are selecting equipment for their designs. Existing facilities often have standards that need to be followed, which may be based on controls, experience or simple preference. Sometimes equipment from different manufacturers may have different life expectancies, which will have a significant impact on operations and maintenance. Also, certain manufacturers may offer advanced resources for training and service on the equipment, which aids facilities personnel in maintaining the equipment properly.

However, maintenance and operations are not always the top priority when it comes to the design phases in a new construction project. Mechanical engineers need to make sure their design is sound and accepted by the architect and ultimately, the project manager. Space considerations and budget typically come into discussions before maintenance when these decisions are being made. While design engineers may feel that facilities considerations are still a high priority when balancing all the other project constraints, where this falls in relationship to the rest of the project team's preferences varies.

INCLUDING THE FACILITIES TEAM IN THE DESIGN PHASE

Often, the group that oversees a construction project is a separate division of the company from the facilities team. Many times, the two groups do not understand each other's requirements: project schedule and budget versus operations and maintenance after the project is completed. Sometimes, these two groups of a company do not even get along, blaming each other for poor planning and unreasonable requests. Regardless of how a company is organized, all members from the owner's side should represent one common united message for construction projects.

As mentioned previously, the consultants must consider the project manager's requirements while also taking maintenance and operations items into account. While the engineers designing the project often consult with facilities personnel to discuss these items (existing conditions, preference of equipment, experiences with different products and general knowledge of known challenges throughout an existing facility), it is important to consider when these conversations are taking place. All mechanical engineers interviewed agreed that communication between designers and FM personnel is of utmost importance.

However, if these conversations do not occur until the construction document phases of the project, then any new information that comes from these discussions could result in many changes to the project documents (and ultimately the project budget). If there is a facilities team on the owner's side for a construction project, it should be involved starting in the schematic design phase so that the designers take FM input into consideration from the beginning.

Of course, all parties need to be flexible when it comes to outlining project requirements from the beginning. Some of the requests from the FM group may be nice to have rather than strict essentials; however, it's important to understand the pros and cons of implementing these ideas and prioritize accordingly. Summarizing and discussing these items from the beginning of the project will lead to fewer surprises, arguments and changes as the project moves forward.

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Facilities personnel should be involved in construction projects as early as possible in the design process.

VALUE ENGINEERING

Teams typically follow a value engineering method when looking to decrease project costs due to budget constraints. Engineers are asked to identify items that could be modified to save money on the construction side, and they present the options with a list of pros and cons. Then the project manager will decide how to proceed. However, the engineers and the project manager do not always have the background in or insight into maintenance and operations procedures, and may not fully understand how these value engineering items could impact the long-term operation of the systems without input from the facilities team.

While value engineering is common in many projects, the bigger question to consider is why it got to value engineering in the first place. Who came up with the initial budget number, and how? If the facility management team was not involved in the initial stages of the project, then considerations for operations and maintenance may not be included in the project budget number. Additionally, if the contractor is not brought on board early in the design phases, constructability issues and concerns would not be considered, which could also lead to additions to the project budget.

PROCESS IMPROVEMENTS

There are certainly improvements that can be made by all parties involved in construction projects. The mechanical engineers who were interviewed for this article acknowledged that what they design on paper is not always how the final product will truly operate, and that some could improve upon their understanding of the maintenance applications in the field.

One method they suggested is to include the engineers' involvement in all inspections throughout construction, as well as commissioning and start-up reports, in the initial scope of work. Even though most consultants walk away with the project team once construction is completed, it could be beneficial for them to return to the site and discuss the space with the facilities team to maintain that relationship and follow up on how the building is operating.

A very common theme throughout these interviews was the belief that facilities personnel should be involved in construction projects as early as possible in the design process. Bringing FM's in when construction documents are already in place means that the budget and schedule

were likely developed without incorporating the operational perspective. Clear communication between all parties starting from the schematic design phase of any project — another overwhelmingly common theme throughout these interviews — is key to ensuring that all project priorities are considered.

If a project comes to value engineering due to budget constraints, the team needs to discuss all impacts of each option. Many value-engineering items consider how a project can save on construction costs but do not evaluate how it will affect ongoing maintenance costs once the project has been completed. It is important for both the engineers and the facilities team to help the project team understand these impacts when discussing value engineering for these decisions to truly benefit the project, and ultimately, the company.

Additionally, it's beneficial when facilities personnel are flexible when discussing their desires for a construction project. It's important to raise concerns with equipment or access, but also to evaluate these needs in terms of how they relate to the project budget and schedule, and how they may impact the company in long-term versus up-front maintenance costs.

Facilities personnel take pride in the buildings they operate and maintain, so of course they want to ensure that what is built will succeed. It is important for everyone on the owner's side to understand that they are on the same team and are working toward the same goals: a successful construction project. **FMJ**



MARY ANNE SCHMITT is a facility operations manager in Los Angeles, California, USA. She received her bachelor's degree in mechanical engineering from UCLA and worked as a mechanical designer and energy engineer before entering the field of facility management. She recently completed her master's degree in building construction management from Purdue University.



JAMES L. JENKINS is a professor in the Department of Construction Management at Purdue University in West Lafayette, Indiana, USA. His research interests include planning/scheduling, construction safety and the use of augmented reality on jobsites.



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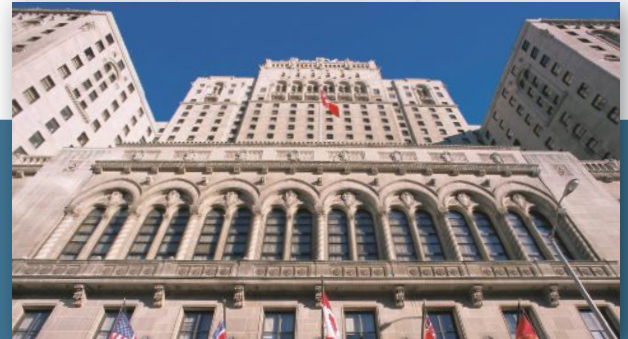
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11 a.m. - 12 p.m.

Concurrent Educational Sessions 2.01 - 2.04

12 p.m. - 1 p.m.

Networking Lunch 3.0

1 p.m. - 1:30 p.m.

Dessert & Coffee | Expo

1:30 p.m. - 2:30 p.m.

Concurrent Educational Sessions 4.01 - 4.04

3 p.m. - 4 p.m.

Concurrent Educational Sessions 5.01 - 5.04

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9:30 a.m. - 10:30 a.m.

Concurrent Educational Sessions 6.01 - 6.04

10:45 a.m. - 11:45 a.m.

Concurrent Educational Sessions 7.01 - 7.04

12 p.m. - 1:15 p.m.

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ESTABLISHING THE BOUNDARIES OF YOUR MSS

BY CASEY MARTIN

As a facility manager, your goal is to optimize your FM operations to support your organization's mission and business objectives. You have likely heard about the value that standards can bring to an organization¹ and you've been considering implementing a management system standard (MSS).

The first step, of course, is to determine which MSS is right for your organization — ISO 55000, Asset Management; ISO 22301, Societal security - Business continuity management systems - Requirements, etc. The article, "The Right Fit: Selecting an FM management system standard for your facilities" in the May/June 2016 issue of IFMA's FMJ can give you some guidance there. As you look at the scope and requirements of any MSS, a natural next question might be, "How do I begin to eat that elephant?"

Don't be discouraged by what appears to be a massive, resource-heavy undertaking. This is the first in a series of articles that will help you break down the International Organization for Standardization (ISO) management system process into bite-sized pieces. It will help to understand that, while each MSS has its unique requirements, all ISO management systems

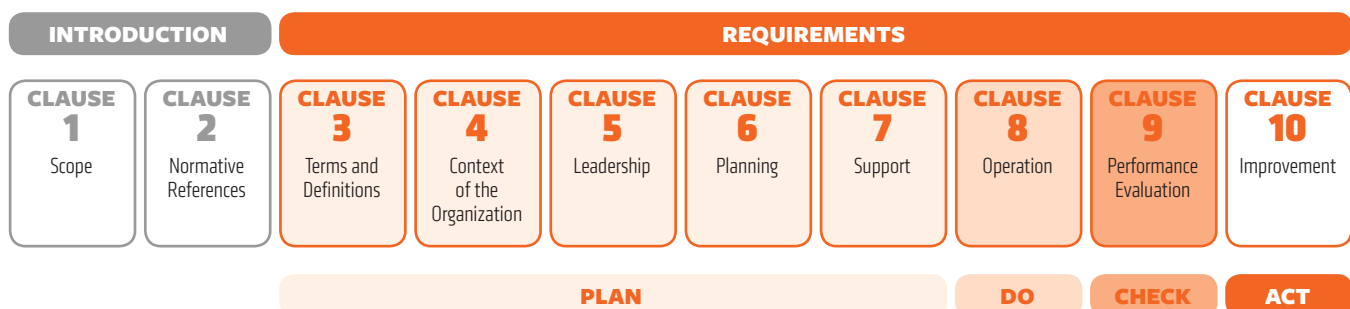
begin with the familiar Deming Cycle — plan-do-check-act (PDCA) — as a framework (see figure 1).

The first step in devouring the ISO elephant is to define the parameters for what will be included in the certification. These boundaries are not the MSS Clause 1: Scope that you see in Figure 1. These borders establish which parts of your organizational assets, facilities, processes, policies and locations will be included in the certification program. By defining these parameters early, you'll be able to build the decisions that follow upon a foundation with defined edges.

FACILITIES AND INFRASTRUCTURE INCLUSION

You can base the decisions on which facilities to include on multiple criteria, such as organizational alignment, geographic considerations, or type of physical or technology asset.

FIGURE 1 Relationship of ISO MSS to PDCA Cycle



Additional criteria may surface as you begin to look at the facilities within your organization and analyze how they contribute to the business mission and impact the organizational objective delivery:

- **Organizational alignment** can include criteria that determine metrics for the significance of each facility to the primary mission of the organization, such as:
 - *Mission criticality*
 - *Activities performed within the building (e.g., administrative functions, retail, manufacturing, health care, education, assembly, training, recreation or housing)*
 - *Locations of buildings in relation to the organizational layout (e.g., on campus or off campus, airside or landside, public or private)*
 - *Climate of the facilities (economic, political or environmental criteria)*
 - *Distinguishing outliers to the management system that may not be applicable (for example, a storage warehouse in Antarctica may not be subject to the same procedures, policies and continual improvement plan that will be applied to facilities within the boundaries of the management system standard)*
- **Geographic location** can delineate criteria based on the physical location or proximity of facilities or infrastructure, such as proximity to other organizational assets, to land or water features, to climate zones, to useable renewable energy sources, to population, etc.
- **Physical asset** criteria can set boundaries for which parts of a facility or campus will be included in the MSS certification. This category can include items like equipment, infrastructure, buildings or technology.

ORGANIZATIONAL INCLUSION

Organizational structure is the next consideration and delineates which departments, entities or functional roles within the business should be included in the boundaries of the certification.

FIGURE 2



Include parts of the organization that are critical to your FM operations. These departments should be both willing and able to commit to the processes, policies and continual improvement of the MSS, as they will need to dedicate resources and time to support their involvement. You can facilitate commitment by helping these departments understand the value proposition of implementing an MSS for the whole organization.

During the certification process, you'll need to understand and document the impacts to the management system if a part of the organization cannot conform. It's better to understand these factors before certifying rather than to invest in the inclusion of departments that cannot maintain the expectations set forth in the MSS. Nonconformity with the established MSS can be a problem for maintaining certification down the road. The focus should not only be on achieving certification, but also on maintaining and continually improving the performance of the management system and its effect on the organizational mission.

Some departments or divisions that may integrate and overlap with an FM management system standard and contribute to continual improvement can include:

- Finance
- Procurement
- Real estate
- Engineering and maintenance
- Asset management
- Human resources
- Marketing and sales
- Information and communication technology
- Space planning
- Energy management
- Sustainability
- Environmental health
- Safety and security
- Program or project management office

After you have determined the boundaries for which facilities and infrastructure components to include, as well as which parts of the organization to consider, you can decide which organizational processes should be included within your MSS. Not every FM process needs to be included in the MSS for certification. For example, it wouldn't be necessary to include the procedures for outsourced janitorial services, unless they contribute toward more effective delivery of FM services.

A procedure for performance validation may be more appropriate to align service delivery with the organizational and financial goals. You should definitely consider those elements of the organization that contribute to effective and efficient delivery of FM services. Establishing criteria for which policies and procedures to include can be structured around themes for serving customer needs, improving employee efficiency, increasing productivity, reducing workplace calls or any other metric that is considered important to delivering the organizational mission.

Once you establish the criteria for policies and processes, evaluate the methodology for storing and

tracking these crucial documents. Analyze whether using an enterprise asset management system (or a more sophisticated document management system) will work best for maintaining, disseminating, tracking and improving the MSS.

So far, we have looked inward at the organization to determine which physical and procedural parts would be best suited for inclusion in the MSS. Now, let's turn toward the requirements listed in the MSS and review which of these are applicable to your organization and which can be excluded.

These requirements are known as the shall statements. Carefully reading through the shall statements and noting any that are not applicable to the organization can help your team focus on those that are relevant. You will need to justify the exclusion of any requirements when compiling the certification scope document. Limit your exclusions to only those requirements that are not applicable to your organization — include all others in the scope of the management system.

ORGANIZATIONAL CONTEXT REVIEW

Each organization will determine what factors drive the internal and external purpose of the facility management system, what constrains the system and what outcomes are most significant to the business. Defining stakeholders, setting expectations and understanding their requirements will all be important components for analyzing the organizational context of the facility management system.

External drivers are often associated with improved stakeholder confidence and assurance by defining mutually established outcomes and how they will be attained. You can support delivery of occupant

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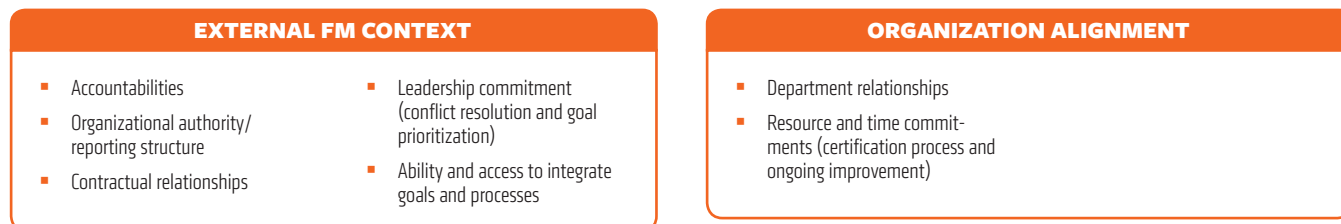
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FIGURE 3



organizational objectives through delineated activities, tools, processes and relationships.

Internal drivers focus on improving business performance through optimized financial investments that consider changes to investments and resources to service outcomes. Another internal focus may be service delivery, which analyzes the risks and potential consequences against financial goals. In-sourcing versus out-sourcing may be a consideration for service delivery options. This will affect how the MSS tracks performance and improvement.

Some stakeholder requirements that are important to understand early include the financial information and reporting to both internal and external parties, facility management decision-making criteria and non-financial reporting requirements.

Organizational context includes reviewing what the organization must do, wants to do and has the capacity to do. The must-do list is established by the organization's regulatory and statutory obligations. The want-to-do list will contain goals that meet stakeholder needs or align with the organization's primary objectives. You must analyze and understand the existing capacity to deliver both categories and sustain performance and improvement early in the process to discover gaps and determine the scope and boundaries for implementing your MSS. You can also include an additional element of organizational context, such as future goals to adapt to changing industry and market conditions.

When reviewing the boundaries of the management system and the span of influence it will have over organizational policies, procedures and daily activities, it is also important to consider any interfaces required or relationships with other

management systems in place within the organization. Many ISO management system standards are designed to integrate well with each other and can offer overlapping benefits to an organization.

For those of you brave enough to venture down the path to ISO certification: Start looking at your organization in terms of what you would include in the certification boundaries, what criteria you would use to establish inclusion and how the organization is structured to support the certification process and continual improvement goals. Part of this support will come from gaining leadership commitment, which will be the next topic in our management system standards series. **FMJ**

If you are interested in getting involved in the development of ISO FM standards, or for more information, contact Laverne Deckert/IFMA Standards at ifmastandards@ifma.org.

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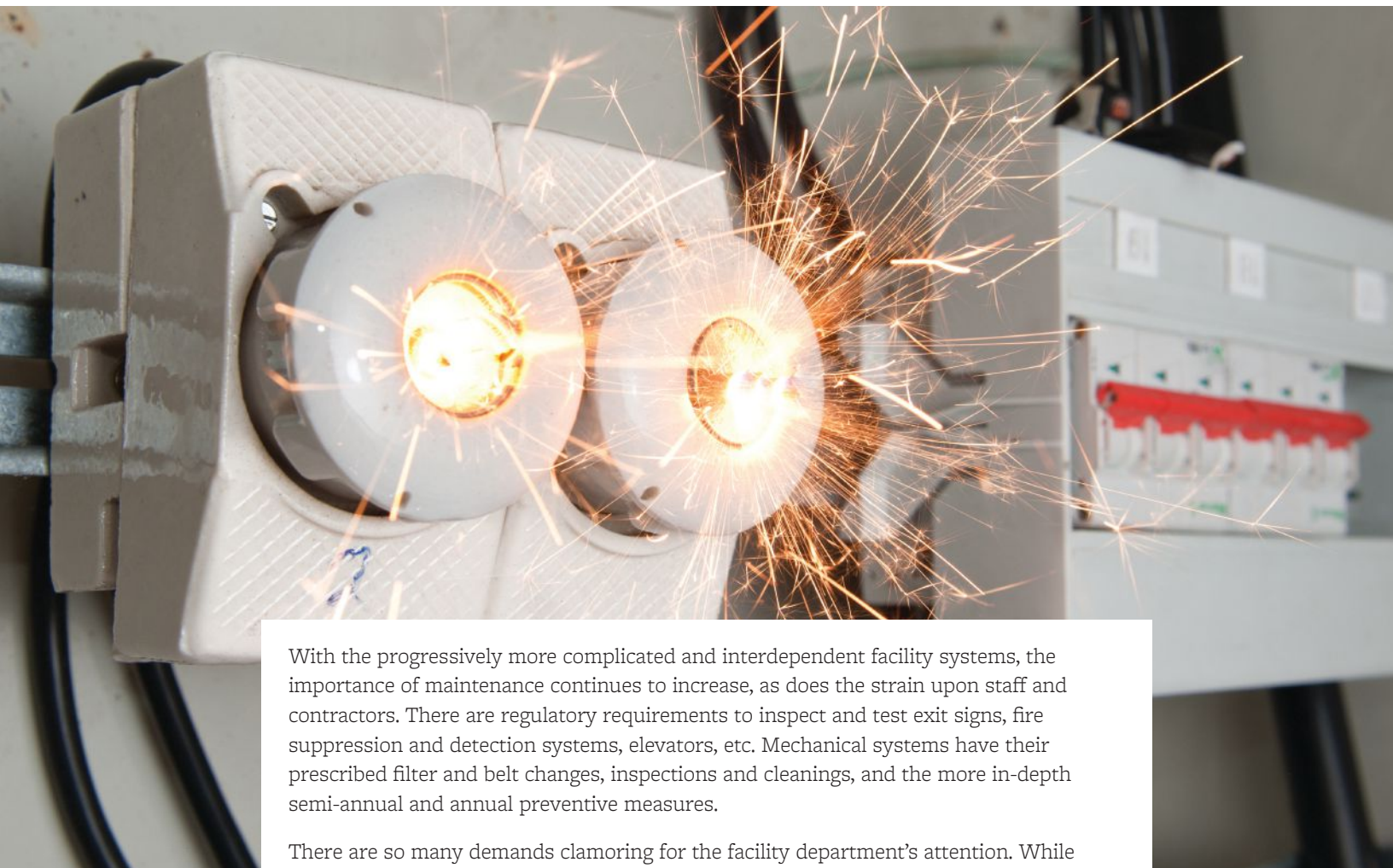
1. Whitaker, Jim. "Standardization: One of Today's Most Vital Global FM Trends." FMJ Jan./Feb. 2017. p. 32-35.



CASEY MARTIN has more than 20 years of building industry experience and is currently engaged in the Asset Management Strategies practice at Jacobs Engineering. In this role, she consults with private and U.S. federal institutions, providing full life cycle perspectives throughout project development stages. Her approach considers important long-term views such as total cost of ownership, reliability-centered maintenance practices, operation strategies, and processes and policies to align asset management with business and mission objectives.

ELECTRICAL SYSTEMS: **DON'T GET BURNED**

BY JOHN RIMER



With the progressively more complicated and interdependent facility systems, the importance of maintenance continues to increase, as does the strain upon staff and contractors. There are regulatory requirements to inspect and test exit signs, fire suppression and detection systems, elevators, etc. Mechanical systems have their prescribed filter and belt changes, inspections and cleanings, and the more in-depth semi-annual and annual preventive measures.

There are so many demands clamoring for the facility department's attention. While mechanical systems typically spring into the limelight with their whiz-bang pageantry, whirring moving parts and melodic noises, we cannot forget to grant due attention to the electrical systems — the sleeping giant, lumbering in the corner, powering these shiny, prominent fixtures at the flick of a switch.



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ELECTRICAL MAINTENANCE

Electrical maintenance, while not labor intensive, is necessary. In fact, studies have reported that circuit breakers, for example, stand a 50 percent probability of failure within five years, if not maintained to the manufacturer's recommendations.

Breakers can fail one of two ways: open or closed. If the breaker fails open and cannot be reset, all systems, customers, etc. downstream of that breaker are indefinitely dead in the water until a replacement for the outdated breaker can be found. Alternatively, if a circuit protection device fails to open (fails closed), the next breaker up the food chain should trip. However, this assumes that it doesn't succumb to the 50 percent failure probability and that the short circuit coordination was properly implemented.

Ultimately, the building main breaker could open, dropping the load for the entire facility all because a vacuum cleaner on the fifth floor shorted out (it happens). Or worse, the electrical anomaly necessitating activation of the branch circuit breaker could cause the breaker to overheat, damaging equipment, injuring personnel and potentially igniting a fire. Consider the age(s) of your electrical infrastructure and the last time sufficient maintenance was performed. What risk are you passively accepting on behalf of the organization?

Electrical maintenance is relatively simple, especially for circuit protection devices. Manufacturers typically recommend three types of maintenance: mechanical exercising, infrared thermography and current injection testing. These are also recommended by NFPA 70B: Recommended Practice for Electrical Equipment Maintenance, a standard of the U.S. National Fire Protection Association which outlines recommended preventive maintenance for electrical systems.¹

A WORD OF CAUTION

Only qualified personnel, as defined per NFPA 70E, should perform any of these activities. The Occupational

Safety and Health Administration (OSHA) states that proficiency must be demonstrated by an employee before being deemed "qualified."

Also, note that OSHA's standards in Title 29 of the Code of Federal Regulations extend beyond scheduled maintenance to include something as elementary as the reclosing of an opened breaker. In other words, only properly trained staff donning the appropriate protective gear are at liberty to reset a tripped breaker; and that is only after it has been proven that the protection device can be safely closed and the fault has cleared.

Here are some crucial questions to pose (and resolve, if applicable):

- Who is resetting breakers at your facility? Security? Custodial staff? Office personnel?
- Are there lights that are turned off and on at the breaker panel? Who performs those duties?
- Are facility staff qualified to investigate and reset breakers?

It is incumbent on the facility management staff to perform due diligence by identifying and addressing risks such as these.

PRESCRIBED MAINTENANCE PRACTICES

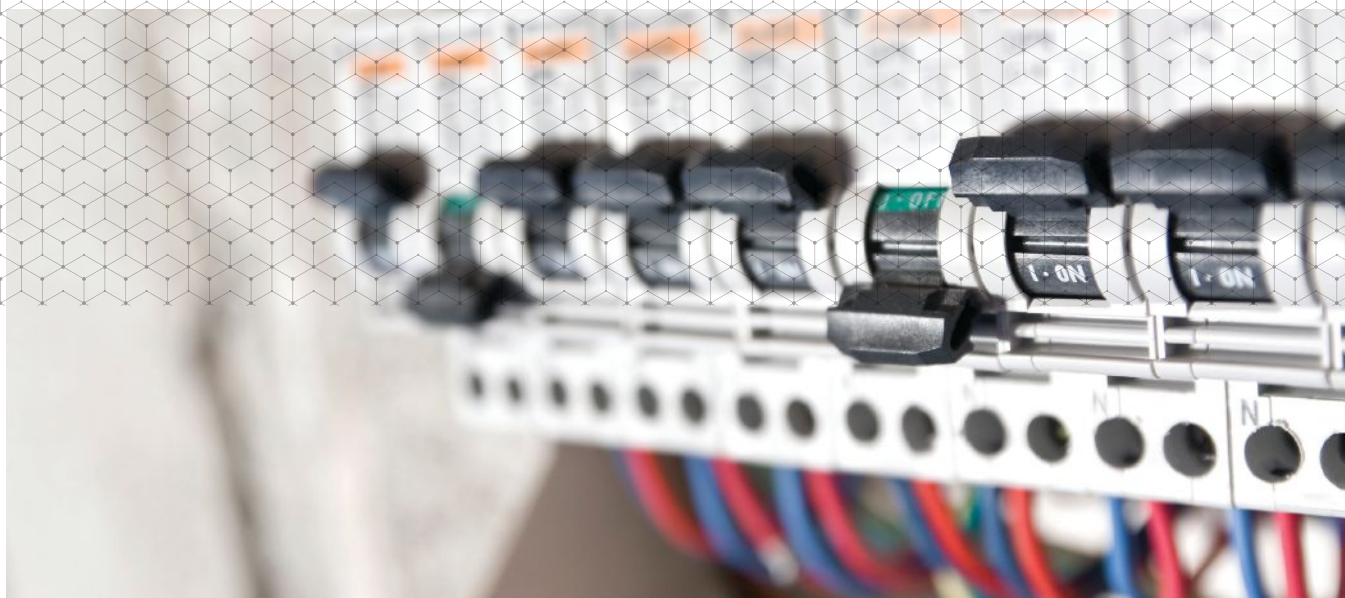
Let's return to the impetus of this article and further discuss the prescribed maintenance practices.

Exercising is the opening and closing of a protection device to ensure proper mechanical operations. Simply stated, it means to open and re-close a circuit breaker, for example. This tasking is truly a case of "easier said than done," as interrupting electrical power, even temporarily, is seemingly impossible for most entities — business stops for no one. However, these efforts are necessary to provide safe and operational facilities. Consider the coordination of these simple, routine efforts practice for orchestrating the far more intensive breaker testing.

Infrared thermography, also known as thermal imaging, is a predictive maintenance that visually represents temperature differentials, identifying areas of concern and needed resolution. Thankfully, the cost of infrared cameras has decreased significantly from the six-figure amounts of 20 years ago to a minimal investment of US\$3,000 to US\$5,000.

However, it is strongly recommended that only certified thermographers who practice on a regular basis conduct

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the thermal scans, as the craft is a mixture of art and science. In addition to circuit panels, include switchgear, motor control centers, disconnects, transformers and switches in periodic inspections.

Breaker testing entails the extraction (“racking out”) of circuit protection devices, typically 200 amperes and larger. Current is injected into the units to measure the speed and amperage at which they trip to ensure they meet the instantaneous and steady-state ratings. It is quite an undertaking to schedule a building or portion thereof to be offline. Typically, it requires a mass effort over a weekend by a third-party and is planned months in advance.

Arc flash hazard analysis is recommended by NFPA 70E and required by OSHA (referencing NFPA 70E). Essentially, the potential energy rating is calculated for each electrical panel, disconnect, etc., which is consequently labeled with such information. The label also notes the corresponding personal protective equipment required to work on the device; this includes exercising and resetting. A short-circuit coordination study would be included with the arc flash analysis and is an extremely useful report for the breaker testing maintenance.

The frequency of these prescribed maintenance activities is dependent upon condition, operating environment and acceptable risk (impact of downtime). For a typical office building, it's generally recommended that breakers, disconnects, etc., be exercised every six to 12 months. Infrared thermography should occur every one to two years; insurers may require a specific frequency and/or provide a discount if thermography is performed. Current injection testing ranges from triennially to quinquennially

(every five years). You should also revisit arc flash hazard analysis every five years, per NFPA 70E.

DON'T IGNORE THE SLEEPING GIANT

To this point, the focus of this article has been on basic electrical distribution systems. However, given that many facilities house server and network rooms and have life safety generators, note that emergency and backup systems — such as generators, automatic transfer switches and uninterruptible power sources — have specific and more frequent maintenance requirements which are governed by the loads served and equipment type. See NFPA 110 for further guidance.

The above is not an exhaustive list of recommendations or requirements; it's a friendly reminder not to ignore the lumbering giant that powers our facilities and the risk associated with operating and maintaining this critical system. **FMJ**

REFERENCE

1. www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards?mode=code&code=70B



JOHN RIMER, CFM, is president of FM360 Consulting and has 20 years' facility management experience in a variety of capacities and industries. He uses his breadth of knowledge and diverse expertise to provide a comprehensive perspective to his clients and students.

Rimer is very active in the facility management community and an avid proponent of education. As such, he is an IFMA Qualified Instructor and an approved Building Operator Certification instructor.

FM Hill Climbers Gain Advocacy Success

BY JED LINK



Each year, FM advocates travel to Washington, D.C. to participate in IFMA's free Advocacy Day and Public Policy Forum. It's an energizing two-day experience that takes participants behind-the-scenes of the U.S. capital. There, they not only rub elbows with key decision makers who craft policy that impacts the built environment, they also learn how the facilities they are visiting meet the unique needs of the federal government.

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In the waning days of 2016, two pieces of legislation made it through the legislative process and were signed into law by President Obama. H.R. 4465, the Federal Asset Sale and Transfer Act, and H.R. 6451, the Federal Property Management Reform Act, are significant because they recognize the life-cycle cost of facility ownership, adopt industry best practices and will reduce waste across the federal real estate portfolio.

But more than the passage of these laws, this is a story of how, with the support of members and other advocacy organizations, IFMA was able to help inform the legislative process and ensure that the result reflects the best available FM principles.

THE ROLE OF ADVOCACY

In national, state and local governments across the globe, public policy decisions have a dramatic impact on FM. In everything from energy policy, sustainability, tax policy, disaster preparation and recovery, emergency response and work safety policy, to facility management standardization, education and training, smart buildings, worker access and mobility and more, FM has a stake.

Formulating sound public policy requires that lawmakers, subject matter experts and advocacy groups work together to find common

ground and meaningful solutions to real problems. To ensure that FM has a place at the table (and not, as the popular saying goes, on the menu), IFMA's government affairs program is robust and global.

Beyond seeking to inform the process in Washington, D.C., there are programs in Europe and at a state and local level within the U.S. In Washington, D.C., IFMA helps lead a coalition of built environment groups in the administration of the High-Performance Building Congressional Caucus — a group of like-minded members of the U.S. House of Representatives who work together in pursuit of sound policy relating to the built environment.

IFMA's function as a powerful voice for the FM industry among policy makers is a fulfillment of a critical mission. A 2016 survey of FM professionals found that 83 percent perceive this advocacy role is an important or very important part of the service provided by a professional association.

ADVOCACY DAY AND PUBLIC POLICY FORUM

Washington, D.C. is a city that was built with a purpose: to house the federal government of the United States. It is, therefore, designed to impress with grandiose vistas, marble facades

and larger-than-life monuments and memorials. In 2015, a record 21.3 million people visited Washington, D.C. Of those, only a fraction got a peek under the hood to see how the government of a global superpower operates. Even fewer got to see how the city's facilities support that purpose.

In recent years, Advocacy Day participants have enjoyed behind-the-scenes access at the Library of Congress (including a memorable trip to the top of the “second-most-famous dome in D.C.” on the Jefferson Building), seen the inner workings of the Capitol Building (where a few even got to sit in a little-known solid marble bathtub once used by live-in U.S. Senators) and received updates directly from the Architect of the Capitol on the massive Capitol Dome restoration project.

But Advocacy Day is more than unique access and once-in-a-lifetime experiences. It's about playing a critical role in a representative government.

A day-long information session, conducted by IFMA's government affairs team, offers an up-close, personal perspective on the current political climate shaping national policy decisions while also laying out policy priorities for the FM industry and the reasons behind them. Attendees get to practice their advocacy in role-playing scenarios — acquiring skills that will serve them in Washington or in their own states, districts and boardrooms.



IFMA helped inform the legislative process and ensure that the result reflects the best available FM principles.

Shifting from information to action, the event moves to Capitol Hill where participants have a unique chance to hear from and ask questions of elected officials and administration representatives at the Public Policy Forum. It is here that the managed chaos of Washington begins to manifest. Senators and members of Congress are called to vote at a moment's notice and often return when someone else has taken the podium. In these situations, participants often witness elected officials seeking common ground, whether between the House and the Senate or across political divides.

The forum is followed by hill visits, during which FM advocates hurry between six House and Senate office buildings and the Capitol Building itself to hold advocacy meetings with elected officials and their staffs. This is the heart of public advocacy.

It's a whirlwind day that must be experienced to be appreciated. Some meetings are held in offices with impressive furnishings decorated with home district flourish, while others occur in hallways or in available office space. Meetings with staff are sometimes interrupted by the Senator or Representative who takes time to say hello between hearings and votes.

While no single 15-minute visit is enough to make a difference, these continued annual advocate meetings are leading to progress. This manifests sometimes in simple ways, such as last year when a key staffer for Congresswoman Eleanor Holmes Norton recognized the group and remembered our priorities. For people who sit in thousands of meetings with tens of thousands of people each year, remembering a specific discussion is significant. It's a sign of traction and familiarity which makes it more likely that FM will be included in critical policy decisions.

FM ADVOCATES ARE MAKING A DIFFERENCE

The U.S. Federal Government doesn't change quickly. It manages more than 500,000 buildings and structures around the globe, making it the world's largest owner of facilities. This means that while change is slow, when it does come to the federal government, it can trigger activity across the industry.

In recent years, FM has made great strides in U.S. policy. Among the most notable achievements, in 2010 President Obama signed the Federal Buildings Personnel Training Act (FBPTA) into law. This bill passed with the help and support of IFMA's advocacy program. It requires federal FM professionals to develop and demonstrate key FM skills.

A note from the Chair of IFMA's Government Relations Committee

It is a tremendous honor to chair IFMA's Government Relations Committee, which is made up of some of the most conscientious and engaged people in our industry.

Not only has IFMA's Advocacy Day and Public Policy Forum grown over the years, but we now host state and local advocacy events across the United States and are pressing the FM case in Europe as well.



LYNN BAEZ

CFM, SFP, FMP

Chair of IFMA's Government Relations Committee

It doesn't take long to realize that in Washington, D.C., decisions are made by the people who show up. IFMA's Government Affairs staff has a much better chance of successfully scheduling meetings on Capitol Hill when they can

say that there is someone in the group from the district the official represents.

It's our mission to make FM advocates a powerful voice for good public policy. To do this, we need each of IFMA's U.S. chapters to participate

by sending at least one representative to Advocacy Day each year. This will help us to build on the success we've already had and to ensure that FM always has a place at the table.

If you are interested in representing your chapter, or if you'd like information about how your chapter can play a role in future advocacy events, please email **Jeff Johnson** at jjohnson@ifma.org.

The FBPTA represents a monumental shift in the management of U.S. federal facilities. For the first time, there is an understanding — in law — that when buildings are maintained properly by trained and certified facility managers, they perform better at lower cost, protect occupant health, safety and productivity, and ultimately maintain their value better, providing a superior return on investment to American taxpayers.

FM advocates used the momentum from this law to advance a stand-alone definition for FM in the Standard Occupational Classification — a list of jobs maintained by the U.S. Department of Labor. FM has historically been included in a broader administrative services category, but a draft update for 2018 includes FM as its own occupation for the first time. IFMA fought for this classification because a stand-alone listing means federal statistics and awareness from high school and college career counselors.

Additionally, in recent years FM advocates have asked lawmakers to begin using a full life-cycle cost analysis regarding federal facilities. Previously, design and construction costs have been the most common method of evaluating expenditures, even though they account for only 15 percent of the overall cost of the building from start to finish.

IFMA's in-person advocacy on Capitol Hill, along with the broad-based industry perspective of the High-Performance Building Caucus, utilized the momentum of previous reforms with the passage of H.R. 4465 and H.R. 6451. The acts, which address the management and disposition of federal property, allow better decision

making regarding thousands of facilities that are no longer used, needed or suited for their intended purpose.

IFMA worked closely with a bipartisan team of leaders in both the House and Senate, and particularly with U.S. Senator Tom Carper (D-DE) and U.S. Congressman Jeff Denham (R-CA-10) to convert advocacy into policy.

WORKING FOR THE FUTURE OF FM

Against a backdrop of partisan gridlock and turmoil, IFMA's advocacy efforts in Washington, D.C. are more important than ever. The good news is that many of the elected officials IFMA has always worked with are still in office and eager to pursue sound policy. We will work to engage receptivity within the current administration concerning ideas that FM advocates can bring to the table.

The table is set for a tumultuous year, and when it comes to issues like energy, taxes and the health of building occupants, IFMA will continue to offer the best policy advice it can get from the most experienced, hardest-working people in the field: our FM members.

One thing is sure: IFMA's Advocacy Day and Public Policy Forum 2017 promises to be one of the most exciting events yet. **FMJ**



Before joining IFMA as Communications Manager in 2013, **JED LINK** worked as a Capitol Hill staffer for nearly a decade, serving in both the United States Senate and the U.S. House of Representatives.



World Workplace Europe

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The landmark IFMA-RICS collaboration, in conjunction with IFMA Sweden, will launch World Workplace Europe this 30 May – June 1, in Stockholm, Sweden. The high-profile World Workplace global events have aimed at advancing and shaping the work of facility management (FM) professionals for the last 30 years.

World Workplace Europe will offer the same valuable education, networking opportunities and inspirational content that FM professionals have come to expect from World Workplace events in the United States, India and Asia, but with a distinctively European focus. Wherever World Workplace is held,

the programming guides participants in addressing timely topics of critical importance to operating the built environment.

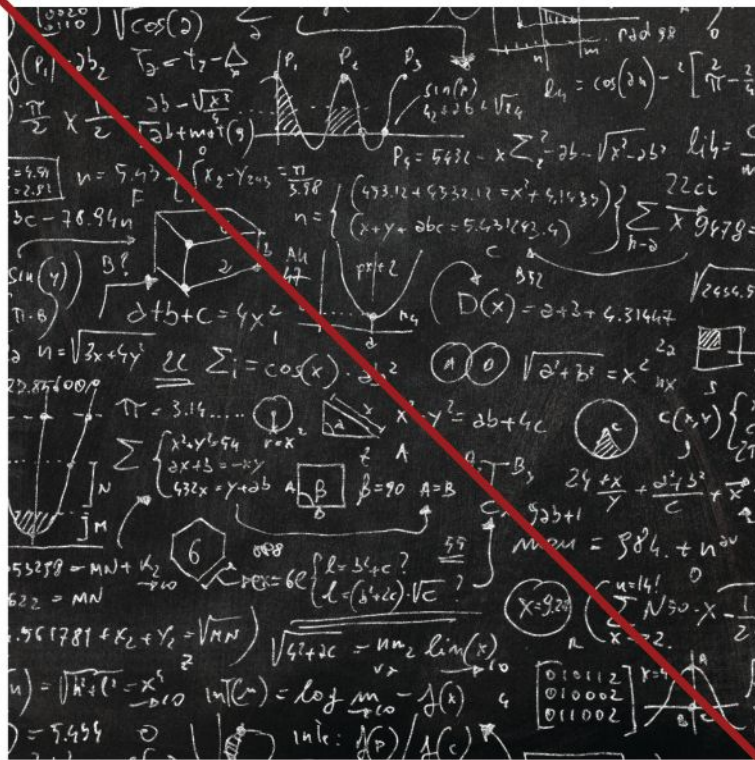
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APPLYING
MATH
IN THE
WORKPLACE

BY BILL CONLEY

during their early education, some children may complain to their parents, “Why do I have to learn math? I’m going to be a facility manager when I grow up. I’ll never use math!”

Little do they know that mathematics is an integral part of any business, and it has a significant role in facility management. Not only do FMs need to know and understand the math revolving around finance and budgeting, but having a general awareness of how math works is invaluable in the workplace.

Quantification is critical; however, besides knowing what needs to be counted or why it is necessary, it is also important to be conversant with how the process works. As an added benefit, exercises in math improve mental sharpness and reasoning ability.

Knowing how to manually (and mentally) perform the functions of addition, subtraction, multiplication and division are fundamental needs for anyone in business and, though it sounds like an oxymoron, such knowledge is positive for negative numbers as well.

This is especially true for facility managers. Due to their role in the workplace, being able to quantify needs and results is critical to getting the job done. Understanding the difference between percentages and fractions or knowing where to place a decimal point can avert what could become catastrophic misunderstandings when delivering calculations in reports.

Math skills are about much more than minutiae. Math skills — particularly numeracy and numerical problem solving — are not only important to everyday job functions but are also a strong indicator of broader cognitive abilities. Cognitive aptitude and acuity is one of the most predictive factors of job success. Developing and maintaining abilities in mathematics makes a positive difference in a facility, as it demonstrates critical thinking, problem solving and logic.

UNITS OF MEASURE

Facility managers are famous for relying on their experience and instinct to make tough decisions. Modern FMs' success depends mainly on flexibility, learning on the job, keeping up-to-date and an ever-increasing level of technical skill. Accordingly, it's important to understand what the numbers say. Mastering mathematics helps FMs analyze and solve problems, as well as learn how to approach tasks methodically, pay attention to detail and think abstractly.

It's easy to assume that being conversant with mathematics is unnecessary in the modern age because of access to computers and calculators that perform complicated math functions. Calculators are omnipresent in modern life: they are on desks, on phones, even on watches — and there is nearly the same constant access to computers. These technologies serve as crutches upon which people rely to do simple math. Many tasks require the use of computers and various aspects of mathematics, from word processing to controlling machines; to analyzing complicated sets of data; and to ensuring quality control in production processes. However, the

work can't be done correctly if there is not the fundamental understanding of the math that is needed for these tools to perform, and the results they are expected to deliver.

If anything, math is more important than ever with the rise of big data. Facility managers who can analyze and interpret data in ways that inspire actionable decisions are extremely valuable. Those FMs who may not even work directly with data are at a disadvantage if they can't understand the basic level of what is conveyed. Mathematical prowess is an extremely critical, chronically overlooked ability, and mastery is indicative of an FM's critical thinking and problem-solving ability. These methods can also help facility managers to project future business conditions, enabling them to adjust strategies as needed.

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THE ART OF THE NUMBER

Facility management is part science; part art. Mathematics is based in the sciences and is fundamental to all of science and technology. However, as evidenced by the golden ratio, without mathematics there is no art. The golden ratio has unique mathematical properties. It is the only positive number whose square is one greater than itself. It is the only positive number whose reciprocal is one less than itself. It is also found in the concept of mathematical limits and the Fibonacci sequence.

These properties make it the unique solution to optimize design — in practicality and in beauty — and has been used by mankind for centuries in architecture. It appears throughout creation and extensively in the human face and body. It's found in the proportions of many other animals, as well as in plants, the solar system and even in the price and timing movements of stock markets and foreign currency exchange.

Its appeal thus ranges from mathematicians to doctors, to naturalists, to artists, to investors, to mystics and, ideally, to facility professionals. It serves as proof that math is the spine of a logic that dictates more than a column of numbers and that art and science are inter-related disciplines. Having this type of knowledge and understanding of mathematics and how it applies to the built environment can set facility managers on a higher level of professionalism.

One of the more touted precepts regarding facility management is that FMs should run their department like a business. To do so, they must recognize that mathematics in facilities is critical thinking as applied to math.

Mathematics in the workplace is quite different from mathematics in school. It is more concrete and more intuitive, yet at the same time more exacting and more unpredictable. It is rich in data and inextricably linked with technology. It is the key to the success of facility managers who serve in the workplace today. Clever, creative strategies count in the real world, but what is just as important are good solutions derived from logic.

QUALITY AND QUANTITY

Quantitative methods are based on mathematics. In the era of big data, they are used by managers to provide solid evidence that can influence decisions on productivity, work distribution and personnel management.

Facility managers are responsible for making decisions to help companies improve productivity and maximize employee efforts. FM departments that are not able to continually prove their worth eventually fail. Managers

can use a variety of methods to inform their decisions, which often involve quantitative reasoning. Quantitative reasoning describes drawing conclusions and making predictions and decisions based on numbers and mathematical analysis.

Facility managers deal with many qualitative measures like quality of life, customer satisfaction and sustainability, which are all difficult to quantify. However, they are the linchpins of successful facility operations. Combining an analysis of both qualitative and quantitative information helps facility managers make appropriate decisions.

The results of qualitative analysis often are ambiguous but may contain additional information, while the quantitative results tend to be decisive. For example, customer surveys might indicate that customers like FM services but would appreciate faster response times. A quantitative analysis has no such extra information because it focuses narrowly on a particular characteristic, such as customer satisfaction.

The different outputs of analysis provide a qualitative output to check what the quantitative data says, and supplemental information can help FMs determine whether to take additional action. The quantitative results reinforce the qualitative results. If the two methods produce different results, more analysis is needed.

Qualitative and quantitative analysis use information about the same characteristic. Once input information is collected, qualitative and quantitative materials are analyzed differently. Qualitative methods rely

on information that is not easily measurable, while quantitative methods deal with data.

If an FM wants to analyze how positively customers view facility services, he can ask a cross-section of employees how they felt about how their respective needs were met. Since this qualitative information is hard to express numerically, he can analyze objective data regarding how many of these employees make complaints or respond favorably in a feedback loop system. He can then express the quantitative information mathematically.

For qualitative information, such as interview transcripts, texts and pictures, it's important to study the material to get insight into what it means. If an FM wants to judge how positively her customers feel about the performance of facility staff, she should carefully analyze what the customers say, paying attention to the positive words they use. This analysis can support her in making a qualitative judgement, such as the conclusion that most customers value what the facility department provides.

A quantitative analysis relies on statistical methods and mathematical evaluation. For example, you may be able to calculate the percentage of customers who experienced problems, versus what percentage were satisfied, and use that information to conclude how facility services are perceived in the workplace.

While business decisions should be data-driven and usually involve consideration of quantitative financial information, that doesn't mean that qualitative information is not important as well. The goal of

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management accounting is to provide relevant information for decision making. By understanding which qualitative factors to examine when making managerial accounting decisions, FMs can ensure they are considering all the business ramifications.

FINANCE

Of course, there's more to math than the basic functions and data analysis. Budgeting and financial planning are important parts of facility management. Most FMs aren't economists, mathematicians or certified public accountants; however, it's necessary to know your company's key metrics, how to calculate them and how to translate FM operations to meet those goals.

It's also important for FMs to understand internal rate of return, return on investment and net present value; not only conceptually, but how to calculate them and what they mean to the business. The more financial insight an FM has, the more effective a manager they will be.

Facility managers are usually challenged by a lack of adequate resources, including facility space, new equipment, supplies and labor. This makes optimal resource allocation a challenge.

Linear programming, a popular technique in operations research and management analysis, is a mathematical method for determining how to achieve an optimal outcome, such as lowest operating costs that might be subject to certain constraints, like limited labor and supplies. Operations researchers and analysts in manufacturing and transportation have used linear programming to analyze and resolve problems related to planning, scheduling and work distribution. Using mathematics, facility managers can learn to apply the same type of methods.

Another tool is factor analysis, a data reduction and analysis technique often used with survey data. This method is effective when performing post-occupancy evaluations or customer satisfaction surveys in the facility. Factor analysis explores correlations in available data to identify underlying, unmeasured factors that could explain those relationships. Facility managers can use factor analysis to, for example, analyze data on employee comfort to identify factors that may explain workplace productivity measures, such as how noise levels or temperature/climate control affect work.

Part of a winning strategy when dealing with management regarding finances is to make and prove assumptions through study and analysis of proposed FM projects. You can perform a feasibility study as an examination of

whether a certain new project is capable of being carried out and benefiting the bottom line. A feasibility study may involve quantitative analysis, such as determining whether a certain project has the potential to save money based on the expected costs of implementing the plan and the long-term payback it could produce.

A cost-benefit analysis is a common type of business decision-making tool that involves quantitative reasoning. In a cost benefit analysis, managers decide the best course of action out of two or more possible choices by attributing values to the expected benefits of each action and comparing those values. For example, if a facility manager is trying to convince management whether to spend money on replacing old equipment or invest in repairing existing units, a cost-benefit analysis for each course of action will help determine the most economical decision.

WAYS AND MEANS

Math isn't tough, but it can be mean. That is, the "mean" is a fundamental of mathematics that represents a specific relationship of one number as the middle point of two extremes. Thus, although mathematics may not be antagonistic, much of the discipline is mean-spirited. In the facilities profession, compromise and finding middle ground in the short term may often be necessary to achieve more visionary goals.

Finding the ways and means to continue maintaining and improving a facility can be augmented through solid math skills. Whether it involves financial considerations, greenhouse gas calculations, understanding of charts and graphs or just basic conversions and ratio rates, mathematics does make a difference in this profession. That fact is as simple as one and one make two. **FMJ**



BILL CONLEY, CFM, SFP, FMP, LEED AP, IFMA Fellow, is 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 and sustainability consulting 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.

Conley has served on the IFMA board of directors, is a recipient of IFMA's distinguished member of the year award and has received the association's distinguished author award three times. He has been a regular contributor to FMJ for more than 20 years and has authored more than 50 FMJ articles.



**IFMA
FOUNDATION**
MAKING FM A CAREER OF CHOICE

Building the Future of FM

How can you help make FM a career of choice? Sponsor a 2017 FM student scholarship through the IFMA Foundation.

The IFMA Foundation has been awarding FM student scholarships since the early 1990s. Each year, the foundation partners with more than 30 chapters, councils and companies to award approximately 40 scholarships to deserving students. As a part of our objective to make FM a career of choice, we want to increase that number, and you can help.

If supporting the FM superheroes of tomorrow is of

interest to you or your organization, then we encourage you to get involved as a scholarship sponsor.

Held during IFMA's World Workplace 2017 in Houston, Texas, USA, the scholarship presentation will be a part of the Foundation Celebration on Tuesday evening, Oct. 17. To enhance the visibility of our sponsors and foster engagement with students, the foundation is planning a mixer for students, sponsors and IFMA Fellows.

Common Scholarship Sponsor Questions

Q: Does the foundation select which student receives a sponsor's scholarship?

A: No – each sponsor has the opportunity to select a recipient from the applicant pool.

Q: Does the foundation set the criteria for scholarship awards?

A: No – each sponsor may set criteria such as geographic, interest in specific industries, degree level, etc.

Q: Must sponsors commit to an endowment or more than one scholarship per year?

A: No—one-time sponsorships are just as welcome as recurring ones.

Q: Do sponsors have the opportunity to name their scholarship?

A: Yes – this is a great way to honor individuals who have made an impact on an organization or to let the world know that your organization supports the future of the profession.

Foundation staff are always available to answer questions about any foundation student programs. Contact amy.arnold@ifma.org, jeff.tafel@ifma.org or steve.lockwood@ifma.org. Download student program information, applications and sponsorship agreements from the foundation website at www.ifmafoundation.org.

Other Beneficial Student/Sponsor Programs

International Student of the Year: This annual award is designed to recognize the “top FM student on the planet.” Visit the foundation website to read about the nomination process. If your organization (chapter, council, educational provider/university, corporation or government department) knows a student who epitomizes next-generation FM leadership on a global scale, share that student's story with us.

ePoster Competition: Witness what tomorrow's FM superstars are studying while earning a degree. This annual competition is held at IFMA's World Workplace. Students are invited from the IFMA Foundation Accredited Degree Programs and educational institutions with facility management programs. Presenting recent FM projects, internship/co-op projects and FM-related research work, students have an opportunity to gain international recognition.

FM Internships: In cooperation with IFMA, the foundation is proud to present our new Internship Board. Connecting talent with opportunity via internships is a key component of the foundation's Global Workforce Initiative. Link to the board at <http://ifma.careerwebsite.com>. Download an internship how-to guide from the foundation website.

ABOUT US

ESTABLISHED IN 1990 AS A NONPROFIT 501(C)(3) CORPORATION AND SEPARATE ENTITY FROM THE INTERNATIONAL FACILITY MANAGEMENT ASSOCIATION, THE IFMA FOUNDATION HAS – FOR 20 YEARS – WORKED FOR THE PUBLIC GOOD BY PROMOTING PRIORITY RESEARCH AND EDUCATIONAL OPPORTUNITIES FOR THE ADVANCEMENT OF FACILITY MANAGEMENT. THE IFMA FOUNDATION IS SUPPORTED BY THE GENEROSITY OF THE FACILITY MANAGEMENT COMMUNITY, INCLUDING IFMA MEMBERS, CHAPTERS, COUNCILS, CORPORATE SPONSORS AND PRIVATE CONTRIBUTORS WHO ARE UNITED BY THE BELIEF THAT EDUCATION AND RESEARCH IMPROVE THE FACILITY MANAGEMENT PROFESSION. TO LEARN MORE ABOUT THE GOOD WORKS OF THE IFMA FOUNDATION, VISIT WWW.IFMAFOUNDATION.ORG. FOR MORE INFORMATION ABOUT IFMA, VISIT WWW.IFMA.ORG.



COMPANY NAME FM:Systems // **EXPERTISE** Integrated workplace management systems (IWMS) // **CSP LEVEL** Silver
// **CSP SINCE** 1998 // **WEBSITE** www.fmsystems.com

FMJ: *What is the technological outlook for FMs who manage O&M for a portfolio of buildings?*

FM:SYSTEMS: Facility management is a profession that is driven by change. Whether it is corporate reorganization, new technology or changes in workplace design, our field is defined by the need to constantly adapt or modify our facilities to respond to change.

Today's highly dynamic workplaces require facilities teams to do more with less. Using traditional tools such as spreadsheets and disconnected floor plans is inefficient at best and often leads to disparate, inaccurate data that is difficult to report on and analyze.

After organizations implement an integrated workplace management system (IWMS) they can often turn tough challenges such as reducing costs and managing their facilities more effectively into positive results across their entire real estate portfolio. Leading-edge IWMS solutions need to fully integrate with cutting edge technologies such as IoT (Internet of Things) sensors to enable organizations to track real-time space utilization and building performance.

FMJ: *How does an IWMS help improve the management of life cycle asset maintenance?*

FM:SYSTEMS: An IWMS can deliver an accurate picture of your preventive and corrective maintenance programs enterprise wide. This enables you to utilize reports and dashboards with embedded key performance indicators to help you quickly identify areas within your facilities where you might be experiencing inefficiencies.

It's simple enough to track the performance of a single piece of equipment, but what happens when you have potentially thousands of pieces of equipment across multiple facilities? Measuring the actual performance of these assets versus expected performance is a critical capability that only a truly integrated IWMS solution can provide.



THE ULTIMATE
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COMPANY NAME Tarkett // **EXPERTISE** Flooring Solutions
CSP LEVEL Silver // **CSP SINCE** 2000
WEBSITE www.tarkettna.com

FMJ: *How can flooring decisions affect maintenance on a daily basis?*

TARKETT: When choosing a new flooring option, daily as well as life cycle maintenance should top the list of considerations along with durability, cleaning, usage and aesthetics. In environments where a floor will experience consistent high traffic and risks from user damage, it may be wise to consider a modular option, where sections can be easily replaced if needed.

Facilities where space will be leased and cleaned by others would be served well with a durable product such as luxury vinyl tile (LVT) that can withstand more than other options, such as a hardwood floor. Furthermore, the right soft surface product and backing can increase your energy savings and provide thermal insulation, and many LVT and carpet products are designed to work harmoniously together to provide that added insulation and durability to save on maintenance cost.

FMJ: *Explain Tarkett's "Thoughtful Design" approach and how it benefits FMs.*

TARKETT: Each of Tarkett's products, whether commercial or residential and soft or resilient, is developed by innovators and pioneers who seek sustainable solutions for the facilities industry and beyond. These masterful creators continuously develop products that bring our clients' visions to life. Our products begin with environmental and social stewardship, which is why Tarkett is a leader in Cradle to Cradle flooring certifications. The company's innovative spirit helped us launch the first closed-loop recycling program in the carpet industry.

Pushing the bounds of what's possible in production also led the company to introduce an innovative digital printing process for Collections Infinities™, which allows customers to co-create with five renowned designers. Focused on strategic design, performance and sustainability, Tarkett will continue expanding opportunities for thoughtful design techniques in 2017.



COMPANY NAME ISS Facility Services **EXPERTISE** Facility Management // **CSP LEVEL** Gold
CSP SINCE 2008 // **WEBSITE** betterworkplaces.issworld.com

FMJ: *As an international service provider, explain how global industry trends are shaping FM service delivery.*

ISS: What we are seeing is a focus on creating better workplaces. The best workplaces are created from a blend of building design, technology and service management. Technology is one of the main drivers for the trends shaping the industry at the moment. However, because people are still delivering most of the FM services, we also see a trend in creating architected service experiences where the service delivery is done by people, but supported by technology.

This aspect of architected FM, in which the service delivery approach is very intentional to create great service moments, will be one of the most important topics in the future around creating better workplaces.

FMJ: *How does the unique Integrated Facility Services (IFS) model created by ISS help facility professionals optimize operations?*

ISS: If you want your employees to have a great workplace experience from the moment they arrive at work, the service delivery of your Integrated Facility Service model must be seamless and smooth. That is what the ISS IFS model is about — delivering all soft and hard services from one outsourcing provider. By doing so, companies are able to experience cost savings as the model affords true flexibility. The IFS solution creates a framework for optimizing the FM workforce, allowing the customer and ISS to efficiently move FM employees to and from the most important and urgent employee touchpoints instantly. ISS has implemented this IFS model on a global scale.

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Bed Bugs in the Workplace?



Establish an Action Plan

BY DOUG WEBB

With the many issues facility managers deal with on a daily, weekly or monthly basis, it should still be safe to say that dealing with a bed bug situation in an office building, warehouse or any other type of workplace is one of the last things most of us would want to have on our plates. Cimicids, perhaps a less familiar but more accurate name for **bed bugs** (*Cimex lectularius*), which also include their close relatives *Cimex hemipterus* (**tropical bed bugs**), *Cimex pilosellus* (**bat bugs**) and *Oeciacus vicarius* (**swallow bugs**), can turn an otherwise storybook workplace into a nightmare for everyone.

Most of us do not like sharing our most personal resources with insects — especially resource number one, our blood. But that is what cimicids are after. While the different varieties of cimicids are very similar pests in many ways and appear to be physically identical, their primary hosts are different. Bed bugs are parasites that feed on human blood, while bat bugs primarily feed on the blood of bats and swallow bugs feed on the blood of birds. All these species will bite and feed on humans, though, and they can all infest the workplace.



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What do
Bed Bugs
Look Like?

Bats and birds do not spend time in the same places that humans do, so bat bugs and swallow bugs are found in different locations than bed bugs and therefore require different control measures. The first thing to do if cimicids are found in your facility is to ensure that they are correctly identified.

This will normally require the services of a pest management professional who is experienced with these pests. The rest of this discussion will focus on bed bugs, which are by far the species most commonly found in buildings, but you should be aware that tropical bed bugs (in Florida only), bat bugs or swallow bugs could be your issue and would require a different approach.

WHAT EXACTLY IS A BED BUG?

Bed bugs are small parasitic insects of the family Cimicidae. This refers to species that live by feeding exclusively on the blood of warm-blooded animals. The common name “bed bug” is derived from the insect’s preferred habitat, which is around beds or other areas where people sleep. Bed bugs are mainly active at night when their hosts are present and still, and they are capable of feeding unnoticed. It is a myth, however, that they only feed on people who are asleep.



A bed bug pierces the skin of its host with two hollow feeding tubes. Through one tube it injects its saliva, which contains anticoagulants and anesthetics, and withdraws the blood of its host through the other. While there is no evidence that they are capable of transmitting disease through feeding behavior, universal precautions should be taken when working in an area where bed bugs are active to protect from exposure to contaminated blood that may be released during inspection and control.

It is well-documented that many people suffer allergic reactions, apparently to the saliva and possibly other related elements that are present during feeding. These reactions can vary from very mild itching and skin irritation at the site of the bite to swelling, sweating and in some cases breathing distress, requiring medical intervention to resolve the symptoms.

Although bed bugs can live for months without feeding, they typically feed every five to 10 days. In colder weather, bed bugs can live for about a year, and at warmer temperatures more conducive to activity and feeding, they can live about six months. After feeding, they return to their hiding place, which is usually just a few feet away, but could be far removed from the feeding area.

When bed bugs are in locations such as an office building where there is a lot of activity and people moving about, they wander too, seeking shelter and a reliable place to

find a meal. They prefer to live in cracks and voids near areas frequented by people. In homes, that is why they like bedrooms so much. But in buildings without bedrooms, they wander about more and find places where people sit or rest for longer periods of time. Human pheromones and kairomones, along with carbon dioxide expelled as humans breathe and heat signatures in areas where people are working, can help direct bed bugs to their next meal.

Bed bugs must crawl or be carried wherever they go — they do not fly. Getting into and infesting a building almost always means they were carried in. They are not adapted to outdoor living and it is simply impossible for a bed bug to walk the distances from one building to another.

After nearly 40 years of almost no sightings in the United States, beginning in the 1950s, they have become increasingly more common every year. While first found primarily in homes and hotels, in the past 20 years or so they’ve been discovered regularly in almost every setting, including most work and public environments. People interact with bed bugs more now than they have in more than 60 years.

BED BUGS IN THE WORKPLACE



Controlling bed bugs in office buildings poses some unique challenges. Not only are these complex environments, but unlike in residential settings, early detection is rare, visual inspection is difficult and the bed bugs are usually dispersed over a large area. Identifying the point of introduction is difficult and may be a sensitive issue. Also, bed bug reintroduction is a constant threat because of the level of human interaction that now exists. Legal, ethical and human relations issues abound, and litigation is an ever-present threat.

In residential settings, bed bugs have private sleeping and resting areas to infest, but in the workplace they tend to move around more and spread throughout the building before anyone is aware of them. In the beginning stages of an infestation, bed bug numbers tend to be low, increasing by periodic reintroduction rather than through reproduction. By the time a pest management professional gets involved, the bed bugs can be scattered and located almost anywhere.

Visual inspection is difficult, time consuming and will have limited results with an untrained inspector. Bed bugs will hide in cubicle dividers, underneath raised floors, beneath cove moldings, in folders and files, and even in computers and other equipment. As mentioned above, bed bugs disperse in two ways: walking or hitchhiking. They can move around the office, to other floors within a building or even to other buildings by hitchhiking on files, boxes and personal items. There are also areas where staff or visitors gather —



such as reception areas, around copiers, lounges and break areas — that may become hot spots for bed bugs.

Most office buildings are cleaned during the nighttime hours when bed bugs are most likely to be active. Cleaning services often store service carts and supplies, including vacuums, onsite. These can become infested and spread bed bugs into other areas of the building.

Even when an infestation is limited to a specific cubicle and the source appears to be obvious, it is inappropriate to assign blame to anyone specifically for the infestation of the workplace. Although the bed bugs may be infesting a single cubicle, they may just as likely have been introduced by an individual in a nearby cubicle, or may have been received in a shipment of files from another location. They also could have been brought in by a visitor or a vendor. Bed bugs can easily travel in backpacks, computer bags, purses, demo cases and just about anything else people carry around with them.

Bed bugs are common in many places where people live and work, so reintroduction of bed bugs is a constant threat. Unless the sources of introduction have been correctly identified and eliminated, reintroduction of bed

bugs into the workplace is likely to continue. Sometimes, the primary source of introduction is an employee or employee's home. This can be an extremely difficult issue to identify, prove and deal with.

Also, bed bug bites normally do not express until a few days after the actual bite. Someone may believe an area is infested because they just noticed a bite. They often do not realize that the bite could have occurred up to a week before the bite was noticed. The infestation must be verified to be sure the correct source of the bite is identified, otherwise the bites will continue regardless of treatment rendered.

Bed bugs in an office pose very sensitive legal, ethical and human relations issues; issues that can become flashpoints for conflict. Examples include the following:

- Worker perceptions that the workplace is unhealthy because of the risk of bed bug bites, allergic reactions or from the perceived health risks from insecticide treatments.
- Worker anxiety about taking bed bugs home.
- Confidentiality concerns about other employees



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The most important thing to remember when reports of bed bugs surface is to listen, learn and act.

finding out that an employee has bed bugs at work or at home.

- Legal implications of an employee being blamed (rightly or wrongly) for the infestation at work.
- Legal implications of the employer being blamed (rightly or wrongly) for the infestation of homes from bed bugs at work.
- Office management and staff often define the word “infestation” differently than pest professionals do. To some people, “infestation” implies a widespread and large population of bed bugs that is reproducing and growing, which is not the typical situation in offices. To others it may mean just one bed bug spotted on a desk or in the break room.
- Bites that occur offsite or that may not even be bed bug bites can be very difficult to resolve with the affected individual(s).

INSPECTION AND DETECTION

Inspection is critical in office infestations. Bed bugs can be anywhere, so the critical first step in control is identifying as many infested areas as possible. Visual inspection, canine scent detection and monitors are the most commonly applied inspection techniques. Observations and evidence of activity should be carefully documented and analyzed to determine if there are any trends over time. If no activity is found, the inspection should still be fully documented.

TREATMENT

Because of the complex environment and movement patterns in an office space, treatment strategies are situationally dependent. Simply spraying the carpet, baseboards and furniture will not be an effective solution.

Other options include targeted vacuuming, cryogenic (freezing) treatment, steam treatment, insecticides and compartment (chamber) fumigation, or heat treatment. There is no one-size-fits-all bed bug program for offices. The pest management professional will need to analyze each office infestation to design a customized program with tools and tactics determined by the specific conditions at the site.

HOW CAN FMS PREVENT BED BUG ISSUES?

The first step is education. It's important to understand

that bed bugs are attracted to a host and are transported primarily by people and their belongings. Therefore, bed bug populations in particular facilities have more to do with the organization's contractors, visitors, vendors and employees than the structure itself. They are really more of a “people” pest than a “structure” pest.

Facility managers should have a published bed bug protocol and staff should be trained to recognize bed bugs and evidence of their presence. There are many resources available either from your pest management professional or reliable sources on the internet, such as the Centers for Disease Control and Prevention, U.S. Environmental Protection Agency and university websites. It is important to implement a regular detection and monitoring program in areas that are most prone to bed bugs, such as breakrooms, lounges, visitor waiting areas, office areas and storage areas for housekeeping.

The most important thing to remember is to listen, learn and act when reports of bed bugs surface. There have been many high-profile and very expensive lawsuits over bed bugs in a variety of settings over the last several years. The recurring theme in these is that the initial complaint was not taken seriously. Listen to the complaint, be very sensitive about the nature and confidentiality required of the complainant, learn all you can about the situation and take control of it as much as possible with decisive, prompt action.

Finally, work with your pest management professional to resolve bed bug issues as quickly as possible. Bed bug issues do not become critical overnight and bed bug infestations are rarely overcome in that timeframe. When everyone understands the situation and then works together to resolve sourcing issues and facilitate treatment regimens, your workplace will soon regain storybook status. Sleep tight. **FMJ**



DOUG WEBB is technical services manager, entomology and regulatory services, with Terminix International. He obtained his Master of Science degree in wood science and technology, with a specialization in wood-destroying insects and wood deterioration, from Mississippi State University. He has served Terminix customers across the United States for more than 34 years.



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HOW TO SELECT A PEST MANAGEMENT PROVIDER

BY HOPE BOWMAN

As a facility manager, you're probably aware that pests can be a big problem. With the ability to spread dangerous diseases, start fires by damaging electrical wires or simply annoy occupants and potentially hurt your hard-earned reputation, pests are best kept outside.

The best way to minimize pest activity within your facility is by working with a pest management provider to establish an integrated pest management (IPM) program. An IPM program focuses on exclusion and prevention strategies to keep pests out, using chemical options only as a last resort. Each program is tailored to the specific needs and challenges of your facilities, so no two will look exactly alike.



There are four main methods of control in an IPM program:

- **Mechanical/physical:** Using objects or tools to help keep pests out or make your facility appear less attractive to them.
- **Biological:** Bringing in natural enemies to deter pests and reduce their populations.
- **Cultural:** Making staff and occupants aware of the program and encouraging them to contribute to its success, especially when it comes to sanitation.
- **Chemical:** Bringing in a professional to place targeted amounts of chemicals — this should be used as a last resort to resolve pest issues.

Every IPM plan should include integrated methods emphasizing non-chemical treatments, regular and ongoing inspections and pest population tracking to analyze the program's performance over time.

Many pest management providers offer IPM programs, and it can sometimes be difficult to discern which is best. Choosing a new pest management provider can seem like a daunting task. But whether you're switching from one provider to another or making the decision to start outsourcing pest control, it's easier to break it down into a few key considerations.

ASK INDUSTRY COLLEAGUES

While it might sound simple, asking your peers is a good starting point when looking for a new pest management provider. Speak with them about the successes and failures that they've noticed with their provider, then use that information to begin weeding out the companies that will not be a good fit for your organization. There might even be a preferred vendor if your facilities are part of a larger network.

Once you've narrowed the list down, you can begin to reach out with more specifics about your facilities and see how well each provider can meet your needs.

START WITH SPECIFIC GOALS

Whether you're looking for a facility-wide IPM program or a little help with a few flies buzzing around indoors, it's best to determine your needs before reaching out to a pest management provider. When creating specific goals, start with the needs that you feel aren't currently being met, and make sure to include any pest issues that you deal with the most.

Finding a licensed pest professional to partner with is critical. Once you do, they will work with you and your staff to establish a customized IPM program that is best for your facility infrastructure.

An IPM program is recommended in most cases, as it is a proactive and cost-effective approach to pest management. Ask your current and prospective pest management providers about IPM to see if their solutions would be a strong fit for you. If any are unsure about the meaning of IPM or do not utilize it, it's probably a good idea to look elsewhere.

ALWAYS GET AN INSPECTION

Before you put any money on the table, inquire about the possibility of an inspection. Many pest management providers will offer a free inspection and assessment. It's important to have a professional come out to your facility to identify potential hot spots and offer recommendations, so that it will be easier to make an informed decision.

The initial inspection is key to establishing a strong IPM program. Customization is a foundational part of any plan, and it will give the pest management provider a chance to determine which products and services they offer that might work best for your facility.



INCLUDE STAFF AND OCCUPANTS

Getting staff and occupants on board with your IPM program is critical to its success. The stronger the partnership is between you, staff, occupants and your pest management provider, the better. Make it clear to all involved that open communication facilitates faster resolutions to pest issues.

Pest management providers should help with this process, too. They know the importance of getting the entire team on board, which is why most are willing to offer training sessions and provide handouts to help educate on the problem areas around your facility and the action steps that should be taken in the case of a pest sighting.

Sanitation and detailed reporting are both necessary parts of an IPM program, and your staff will be the ones most likely to spot a problem first. If trained well, they'll know how to appropriately escalate potential problems so that you can kick pests out as quickly as possible. Occupants should be aware of what to do in the case of a pest sighting, and you'll want to resolve their problems as quickly as possible so that they feel like their voice has been heard.

Thus, make sure to inquire about training programs and educational programs when speaking with a potential pest management provider — it will pay off.

ESTABLISH PEST THRESHOLDS

Simply put, pest thresholds are the amount of a certain pest that a facility can realistically handle. For instance, some facilities might have extensive food areas or cafés and therefore have a zero-tolerance policy for rodents. Any rodent sighting would put them above their desired threshold and require swift action.

These thresholds exist because a variety of factors might make some facilities more or less prone to pests. The factors include the age of the building, proximity to wooded areas, amount of daily foot traffic and much more. It is nearly impossible to keep all pests out, so establishing thresholds can help to determine if a problem is routine or more serious.

Thresholds serve as goals for your facility to work to achieve, so after an inspection talk to the pest management provider about their thoughts on what is realistic. Then, they can begin working on a timetable



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EVERY IPM PROGRAM SHOULD INCLUDE INTEGRATED METHODS AND TRACKING TO ANALYZE PERFORMANCE OVER TIME.

to encourage steady improvements. It may be possible to create a pest-free facility over time by continuing to improve your IPM program, but it's most important to determine what works best for you.

DOCUMENT EVERYTHING

There's practically no such thing as too much documentation when it comes to pest management. Talk to the different pest management providers and see what types of documentation they record on a regular basis.

Factors such as pest sightings, product applications, activity trends and hot spots around the facility should all be recorded. Every pest problem should come with a written solution. When the time comes that you need to show progress, keeping these types of documentation on hand will make it easy.

If your facility is frequently audited, then a pest management provider that helps update these documents regularly should be near the top of your list. That way, you can be audit-ready at a moment's notice.

INQUIRE ABOUT TRAINING

Ask pest management providers about the amount of time that their technicians spend in training, as well as the types of certification that they possess. It's also a good idea to check on certification from the appropriate agencies in your area. This can be the difference between getting a true professional who knows the habits and attractants of each pest and a chemical-happy amateur.

If you're ever in doubt about a current or prospective pest management provider, consider the following questions:

- Am I receiving documentation of pest issues and

recommendations for how to improve my IPM program on a regular basis?

- Is my provider helping me understand the specific challenges that my facility faces when it comes to pest prevention and removal?
- Does my pest management provider diagnose the reasons that may have caused pests in my facility when they do establish themselves inside?
- Do I have speedy access to a pest management professional if I am facing an emergency or challenging situation?
- Am I dealing with licensed professionals who have undergone a rigorous training program?

With any pest management provider, the emphasis must be on creating an effective partnership. Discuss the roles you, your employees and your occupants will play, and then work with your provider to establish open channels of communication between all involved.

Once that's established, commit to the partnership and contact your provider regularly. Keeping them abreast of things that you're noticing in your facility might even help you prevent pest problems before they begin. **FMJ**



HOPE BOWMAN is a technical specialist and board-certified entomologist with Western Pest Services, a New Jersey-based pest management company serving businesses and homeowners in major

Northeastern U.S. markets. Learn more about Western by visiting www.westernpest.com.

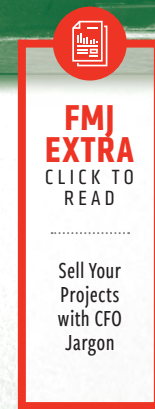
SPEAKING THE LANGUAGE

COMMUNICATING BUDGETARY NEEDS
FOR EDUCATIONAL FACILITIES

BY JAY PEARLMAN

Many facility managers at higher education institutions find themselves struggling to express the critical need to fund routine maintenance and other capital investments. At times, it may seem that they speak a different language than the institution's board members, trustees and other financial decision makers. The reality is that they do.

These financial decision makers live in a world where they are fielding requests for funding for a wide variety of departmental needs. The rest of the time, they're evaluating where best to allocate funding, how much is needed to meet broad campus goals or ways to gain funding to improve campus management. For facility managers to become part of these conversations — and get the results they desire — it pays to share a vocabulary with financial stakeholders. Through a common language, facility managers will find it easier to create a more compelling case for their funding needs.



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PUTTING NEW WORDS TO FACILITIES NEEDS

The biggest challenge that facility managers may face in communicating with financially minded professionals is letting go of jargon-heavy terminology. Too often, facility managers turn to technical terms to explain challenges and solutions to the chief financial officer or board of trustees. A better way to communicate to these high-level executives is to express the funding need in terms of the executives' concerns.

In other words, rather than describing the decreased delta-T of the primary chiller and the inability to move sufficient chilled water through a constricted primary loop, you'd be better served by jumping straight to the end results — that if a fix isn't funded, several buildings will receive insufficient cooling, becoming uncomfortable and putting sensitive scientific research at risk during the warmer months.

It can be challenging to put new words to your departmental needs. But by leaning on a shared vocabulary, facility managers can help campus administrators to more effectively make decisions that impact the campus at large. Consider the following tips for creating a shared vocabulary and improving communication across department lines.

1 CLEARLY OUTLINE AND PRIORITIZE YOUR MAINTENANCE NEEDS.

To make a strong case for funding, it's important that facility managers first have a clear understanding of their needs. That means stepping back to take a thorough look at the range of building maintenance needs. It's unlikely that every need will be addressed at once, so it's important to have a strong sense of the most pressing updates and investment needs.

To prioritize budget requests, facility managers should consider each building's needs in terms of the following three categories:

- Current condition
- Function
- The impact of any improvements on the organization's overall mission or its financial performance

By prioritizing buildings according to the criteria listed above, facility managers can more easily assess risks and better identify prime opportunities to benefit from investments. In addition, it's possible to use these groupings to develop building portfolios that reflect a certain performance within the overall campus mission and the organization's strategic direction. This knowledge can help to generate a solid plan for capital investments in the years ahead.

The first priority for improvements should be any projects that could potentially dislodge academic programs or students if they are not immediately addressed. Next, focus on any deferred maintenance or systems that are well past due for improvement. Often this includes any maintenance that has been pushed back for several years due to a limited budget.

In presenting funding requests to decision makers, it's important to outline each of these needs as simply, and concisely, as possible. Consider this list the "key takeaways" that board members or trustees need to understand in order to make a more informed decision on the situation that needs funding.

2 LOSE THE JARGON.

It's natural that every profession should have its own unique language, and facility management is no exception. However, it's important to remember that outside of the department, that technical language doesn't carry the same impact. Other departmental leaders, administrators or board members are likely to have more limited experience in dealing with facility maintenance concerns, and thus will be more limited in their understanding of how building performance

relates to overall campus management. Falling back on technical language in describing a problem is more likely to cause confusion than convey a sense of urgency.

Instead, facility managers are likely to gain more allies in the C-suite when they explain challenges simply and in terminology that any layperson can understand.

It may be helpful to turn to clear metrics to make the funding need understood. Data often serves as a common language for stakeholders in campus management. It can be used to provide a more complete picture of the problem by quantifying a building or system's current, versus expected, performance. In a sense, data can validate facility managers' concerns.

3 LET THE DATA SPEAK FOR YOU.

Facility managers will already have most of the data they need to vividly describe the maintenance backlog problem. However, using data collected and analyzed by third-party professional or trade organizations gives facility professionals an additional advantage. It provides validation of the problem as well as benchmarking against peer colleges and universities. Third-party analysts have the data necessary to present a broader picture of where an institution's facilities rate among their competitors. This suddenly puts maintenance in the same league as new construction in providing universities and colleges with a competitive edge.

By using this independently gathered information as part of a shared vocabulary, a vocabulary to which financial decision makers will more readily respond, facility managers will find they can more rapidly gain approval for their funding needs.

In addition, third-party analysis of facility data will allow institutions to more easily compare their facilities to buildings at other institutions on an annual basis. In-house data collection, on the other hand, is more likely to limit the data overview to one institution over a briefer period.

4 FOCUS ON BIG-PICTURE GOALS.

As mentioned above, it's helpful to

IT'S IMPORTANT TO OUTLINE FUNDING NEEDS AS SIMPLY, AND CONCISELY, AS POSSIBLE.

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EXPLAIN FACILITY ISSUES IN TERMS OF THE LIKELY RESULT, RATHER THAN A TECHNICAL DESCRIPTION OF THE PROBLEM.

explain facility issues in terms of the likely result, rather than a technical description of the problem.

Consider how the result relates to the organization's broader goals. What is the biggest concern of board members or trustees on the topic of improved campus management? How will these stakeholders and the overall institution benefit by finally funding deferred maintenance?

Perhaps the most common question facility managers should expect to hear concerns the projected return on investment (ROI). It's important to not only have an answer calculated, but consider how that ROI might relate to broader organizational goals.

For example, higher education institutions that defer maintenance on older buildings to invest in new construction that gives their college or university a competitive edge are likely to find their long-term costs ultimately overwhelming. That's because as routine maintenance is put off, the eventual cost of the fix will be much higher than the cost to conduct preventive maintenance in the first place. At some point, plants, equipment and other critical systems will suffer a failure that cannot be put off. Depending on the system, this could have a damaging impact on faculty, students and the institution's overall image. Worse yet, if maintenance is being deferred across the board, multiple components may begin to fail at once, causing costs to escalate.

Systems that are regularly maintained through planned funding of routine preventive maintenance, on the other hand, can be expected to last longer. Well-maintained systems also typically cost less to operate.

By examining the ROI and considering the potential impact of facility issues prior to meeting with decision makers, facility managers may find they're better equipped to communicate their needs.

THE EFFECTIVENESS OF SIMPLICITY

Remember, relying on a common vocabulary and simple, concise explanations does not simplify the problem. If anything, this simple adjustment in communication will help facility managers to better express the urgency of their requests. Using a shared vocabulary will prevent any potential confusion that could delay funding for a critical need.

Make the case for immediate intervention and ongoing attention as the best solution for minimizing the impact of a growing problem. Facility managers will find greater success in making the implications of their always-growing maintenance backlog understood by selecting their language carefully and relating the argument in terms of their audience's concerns.

Whether speaking to the board of trustees, faculty or staff, the facility manager needs to make sure that the audience understands the true impact of the problem and the solution to best mitigate it. Emphasize that these solutions are a campus-wide effort, and that the impact and ROI will accrue over time. **FMJ**

JAY PEARLMAN, associate vice president, marketing, has been with Sightlines since its inception in 2000. Over those years, he has played a variety of roles across the company, including those in operations, business development, quality control and product development.

As a key member of a new firm, Pearlman played a leading part in the development of the Return on Physical Assets Process, Sightlines' member website, and the tools used to provide comparative benchmarking and analysis. Aside from his work on Sightlines facilities offerings, he also led the successful development and implementation of both Go Green and Housing Measurement, Benchmarking and Analysis services.

A large iceberg is shown floating in the ocean. The tip of the iceberg, which is visible above the water, is covered by a series of black rectangular boxes containing white text. The text reads: 'POSITIONING', 'TOTAL COST', 'OF', 'OWNERSHIP', 'TO', and 'LEADERSHIP'. The water is a deep blue, and the sky is a lighter blue. The iceberg itself is white and has a jagged, textured surface.

POSITIONING

TOTAL COST

OF

OWNERSHIP

TO

LEADERSHIP

BY RICH GRABMEIER AND MARK HENRY

More than 90 percent of an iceberg's volume is underwater, so most of its mass isn't visible. Similarly, 90 percent of the total cost of building ownership is in the operating budget, but this cost isn't always accounted for when considering new building projects.

As a facility manager, you understand the costs incorporated in the construction and operation of a building. The challenge is, how do you provide these insights to your leadership in a digestible way?

Discussing total cost of ownership (TCO) can be an effective way to bring leadership to the table and help them understand the behind-the-scenes costs of a building. Speaking in terms of TCO allows you to challenge your C-suite to view facilities as business decisions and take more control over operating expenses.

The following are key tips for positioning TCO to leadership and explaining the holistic picture of a building's lifetime cost, not its one-time price tag.

BE RELATABLE

What senior leader doesn't want to hear about ways to save money for the business? Right out of the gate, it's helpful to explain how TCO can save your company money and provide a competitive advantage. A study conducted by Microsoft reported that in today's digital age, most people lose interest after eight seconds.¹ If you can pique the attention of your audience, it will be easier to make your case.

PAINT A HOLISTIC PICTURE

Often, construction companies win business by providing the lowest in-place cost during the bid stage. In these cases, the upfront savings on materials end up being a burden for customers throughout the life of the building due to energy inefficiencies and lower-quality products. Calculating TCO can help ensure businesses are getting the solution that provides the best long-term value.

Painting a holistic picture with your leadership team can help them understand all the costs and values that comprise a building's operating expenses, such as:

- Energy and energy price escalation
- Maintenance
- Replacement/retrofitting
- Equipment life
- Disposal
- Capital costs
- Inflation
- Tax incentives

Share the following perspective with your senior leadership team: You wouldn't buy a house without knowing what your monthly mortgage payments will be, so don't expect to construct or operate a building without considering the total cost of ownership.

THINK SUSTAINABLY

More than half of the Fortune 100 are working to improve their buildings' energy performance.² Energy efficiency is a major component of TCO and one that companies are paying attention to and investing in.

The International Energy Agency's Technology Roadmap for Energy Efficient Building Envelopes reports, "The quality and energy efficiency of building envelopes are the most important factors that affect the energy consumed by heating and cooling equipment."³

According to the U.S. Department of Energy, 42 percent of the energy consumed by nonresidential buildings in the United States is lost through the building envelope, making the envelope a primary focus when looking to reduce energy usage and costs. Reducing the amount of energy consumed to heat and cool a facility requires reducing the amount of heat transferred through the building envelope.⁴

DEMONSTRATE THE ROI

Planning for the future can lead to significant savings across the lifespan of a building. Businesses now have an unprecedented opportunity to deploy energy modeling that is based on tested data and calculations that estimate the total cost of ownership for new facilities.

Utilize this technology to provide tangible numbers to your leadership that predict return on investment, savings and estimated lifetime expenses ahead of construction. Supplying leadership with hard facts to build your case can help add credibility to your recommendation.

TEACH BY EXAMPLE

Incorporating tangible real-life examples and case studies into your presentation or conversation can be helpful if your leadership team needs to "see it to believe it." Reach out to several companies you may be vetting for a new building or maintenance estimate and ask for customer testimonials that relate to your situation.

By showing senior leadership other companies in your industry are saving on building costs, it may be easier for them to grasp the competitive advantage TCO can offer.

Such examples could look like:

- **Energy efficiency**
A 300,000-square-foot manufacturing facility in

Annville, Pennsylvania, USA, incorporated daylighting systems into its roof retrofit and added light sensors throughout the building to decrease energy costs. With the upgrades, the facility saves US\$11,000 per month in electricity and reduced energy spending by 63 percent.

- **Long-lasting roof systems**

When a community college in Esterville, Iowa, USA, purchased an abandoned stained glass factory to be retrofitted to serve as their new Sustainable Energy Resource Technologies building, the school was pleased to find out that the standing seam roof system installed 21 years ago was still secure and weathertight. Utilizing the existing roof system helped the school drastically cut costs on the new building design.

- **Structural systems durability**

It was the flexibility of a steel structural system that allowed a New York-based building supply company to minimize columns in their facility and develop a more efficient business model. The company saved money purchasing less steel and paying for fewer labor hours when completing building installations.

OFFER OPTIONS

If senior leadership is still having trouble seeing the value of prioritizing TCO, provide them with options. Using energy modeling technology, you can provide a variety of estimates that offer cost and product variations depending on building features.

WORK SMARTER, NOT HARDER

Your time and the company's budget is valuable. Quantify for leadership how much of your time is occupied handling maintenance issues, rather than focusing on higher-level building advancements.

Provide examples from over the years illustrating how much time and money was spent paying for repairs and energy inefficiencies. Quantifying these types of expenses can help leadership see the value in the upfront building investments.

LEAVE AN IMPRESSION

Often at the end of a presentation or document it's useful to have some type of matrix or summary to recap your main points and leave your audience with food for thought. In a survey conducted by Prezi, 46 percent of participants said they were distracted during a coworker's presentation.⁵ So, as it best works for your leadership team, highlight that investing in a building during the initial planning phase will provide the most significant ROI in the long run.

Getting leadership to fully understand the value of TCO is not an easy task, but it's a prime opportunity to provide strategic tips that will lead your company to top performance.

Challenge senior leadership to invest in the company's future to achieve maximum bottom-line results. It's either pay now or pay more later. **FMJ**

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RICH GRABMEIER, RRC, LEED AP, is a business development manager focusing on innovation with Butler Manufacturing. He has more

than 30 years of experience in the building industry, with a focus on product and process trends and improvements. Grabmeier graduated from the University of Texas at Austin with a bachelor's degree in architectural engineering. He can be reached at editorial@butlermfg.com.



MARK HENRY, PE, is a senior research engineer with Butler Manufacturing. He has a Bachelor of Science degree in architectural engineering from

the University of Kansas. Henry has 27 years of industry experience and can be reached at editorial@butlermfg.com.

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Ground fault equipment protectors help prevent costly shutdowns

A complete line of Underwriters Laboratories (UL) ground fault equipment protection (GFEP) devices from Altech Corp.[®] introduce ideal solutions to help prevent costly production shutdowns due to alternating current and direct current pulsating ground faults, as well as overloads and (with some models) short circuits. The technology lineup offers three highly engineered series of devices delivering multiple capabilities and promoting reliable protection and operation of equipment wherever and whenever ground faults may occur. In all three series, ground fault sensitivity levels range from 10 milliamperes (mA) to 500 mA.

The UL 489 Branch Circuit Breaker with Ground Fault Relay (GFL Series) represents an industry “first” by combining a ground fault equipment protector with a UL 489 Branch Circuit Protector, which eliminates a need for upstream circuit protection.



The UL 1053 Ground Fault Sensing and Relaying device (GF Series) provides residual current protection for circuits with loads up to 63A. This device represents an ideal retrofit GFEP where standard overload and short circuit protection is already being provided (or will be provided) by other means.

The UL 1077 Ground Fault Relay with Overload Protection (GFR Series) serves as a combined Equipment Ground Fault Relay and Supplementary Protector (RCBO).

For more information, visit www.altechcorp.com or contact info@altechcorp.com.

LED lights designed with versatility in mind

HyLite LED Lighting, a division of ARVA, LLC, introduces the new Lotus™ LED Line. The 180-degree adjustable mounting arm allows the Lotus Lamp to install in multiple positions and at different lengths for use in a wide variety of applications, including recessed cans, canopy lights, parking garage fixtures, parking lot lights, flood/spot lights, high ceilings and high/low bays.

The LED Lotus is available in sizes ranging from 20W to 100W to replace anything up to 400W metal halide and high pressure sodium lamps with up to 80 percent energy savings. An optimal 120-degree beam angle and ultra-efficient 140 lumens per watt, delivers high quality illumination with maximum lifetime energy savings. At 60,000 hours of rated life, the HyLite

Lotus lasts three to five times longer than metal halide and high pressure sodium lamps, greatly reducing regular maintenance costs and offering the lowest total cost of ownership. The Lotus comes with a free, 20-kiloampere in-line surge protection device to protect the lamp against disruptive and damaging power surges and transients. The HyLite Lotus is completely protected from contact, dust and water splashes, and waterproof quick-connectors make it ideal for temporary lighting.

For more information on the HyLite Lotus LED Line, visit www.hyliteledlighting.com.



Ultracapacitor-based modules deliver reliable backup power to facilities

Maxwell Technologies, Inc., a leading developer and manufacturer of ultracapacitor-based energy storage and power delivery solutions, announces the Generator Starting Solutions (GSS) product line. As the newest addition to the company's ultracapacitor-based product offerings, the GSS modules help start commercial and industrial standby and backup generators (gensets).

Grid power failures are a major concern for power-critical facilities such as hospitals, hotels, data centers and server farms. Maxwell's GSS modules support a variety of gensets, from towables to stationary power systems, and bring a high level of confidence to building operators that gensets will start when needed. The GSS product line consists of Battery Council International group 31 form factor modules that are installed with or in place of batteries for starting standby and backup generators in commercial and industrial buildings.

With high power, fast response and long operating lifetimes, ultracapacitors are more durable, more reliable and more efficient than batteries. They provide high-burst starting power to gensets ranging from 50 kilowatts to 3.5 megawatts. For National Fire Protection Association 110 Type 10 requirements, GSS modules greatly assist in restoring power within 10 seconds of failure.

Find more information on Maxwell's GSS module at www.maxwell.com/gss.

Video pipe inspection systems offer maintenance pros Wi-Fi capability

Lightweight Gen-Eye POD® video inspection systems from General Pipe Cleaners now offer optional Wi-Fi capability.

The Wi-Fi transmitter inside the monitor allows the user to send the video to a tablet or smartphone to record the inspection. You can send the video on to your staff, team or supervisors for reference or approval right from the field.

The convenient, compact Gen-Eye POD combines camera, reel and monitor in a handy, all-in-one package. The full-size Gen-Eye POD sports a self-leveling camera and 200 feet of Gel-Rod® for troubleshooting three to 10-inch drain lines. The MINI-POD® version carries 125 or 175 feet of push rod with a mini self-leveling color camera small enough to troubleshoot two- to four-inch lines.

A video out connection allows you to record to an external device. The generous 7-inch LCD color monitor mounts on a rugged, flexible gooseneck that swivels for optimal viewing angles, and the durable padded case protects the monitor — and your investment.

For more information, visit www.drainbrain.com/geneye.

New app enables easy Android-style operations for document flows



Ricoh's Android-driven Multifunctional Printers with Smart Operation Panel (SOP) already bring usability benefits to boost your workflow and operations. To offer extra operating options that will enhance your productivity and ease of use, Inepro announces DocuPRO, an embedded solution for Ricoh's tablet-style control panel.

The user-friendly and easy to operate

interface for flexible, secure and cloud-based printing, copying and scanning also features new functionalities such as an integrated time registration system, control panel swipe commands, customizable background/colors and self-service through the option for individuals to self-register as a card-user.

In addition, the DocuPRO Embedded Client combined with Inepro's new

SCR708 RFID reader enables you to authenticate users at your Ricoh SOP. With the Inepro card reader app, firmware updates and configurations for the SCR708 can be remotely executed, and the launcher facilitates easy, personalized home screen organization.

For more information, visit www.inepro.com/en/docupro/embedded/ricoh-sop.

Portfolio of odor control products formulated to eliminate the toughest professional odors

Four out of five cleaning industry professionals say that removing odor from the air is their biggest cleaning challenge (79 percent), per a recent survey from Clorox Professional Products Company. To help, Clorox Professional Products Company introduces Clorox® Odor Defense™ Spray, a new product scientifically formulated to identify and capture odor-causing molecules. Using proprietary technology, it is proven to eliminate — not just mask — the toughest professional odors found in commercial settings.

Clorox Odor Defense products are specifically designed for use on the toughest odors in potential problem areas of facilities such as bathrooms, shared office breakroom spaces, hotel rooms and waste-disposal rooms. The full line of products includes Clorox Odor Defense Aerosol Spray (14 ounces), Clorox Odor Defense Air and Fabric Trigger Spray (32 ounces) and Gallon Refill (128 ounces), which can be used daily to control odor on soft surfaces and in the air, as well as Clorox Odor Defense Timed Metered Aerosol Spray (6 ounces), designed to remove recurring malodor in trouble areas like restrooms.

Visit **www.cloroxprofessional.com** for more information on Clorox Professional Products.

Take Out the Odor

Industry Insights on a Stinky Problem



Odors Stink...

especially in commercial facilities, where they can influence people's perceptions of the overall facility — and cleaning professionals are not alone in their pursuit of taking out odors for good. Following are results from a Clorox Professional Products Company survey of professional cleaning industry decision makers.¹

The Issue

4/5 Four out of five cleaning professionals said **removing odor from the air** was their biggest cleaning challenge.

Spaces with the toughest odors to combat:

-  **23%** Restrooms
-  **22%** Garbage Rooms
-  **14%** Garbage Cans

Odors with the most complaints:

-  **59%** Garbage Odors
-  **41%** Urine Odors



Current Solutions Stink

Products that currently exist are not fully addressing professional cleaning needs...



58% More than half say that their current air odor elimination solution is just **covering up odors, not fully removing them from the air.**

Product characteristics that are extremely important to cleaning professionals:

- 52%** Scientifically proven to remove bad odors
- 49%** Destroy odors, not just mask them
- 45%** Long-lasting
- 43%** Formulated for the toughest odors

46%

Cleaning professionals who have issues with air odor elimination products say they get **complaints about fragrance.**

Eliminating odors is more important than strong fragrances when it comes to an air odor elimination product.

¹ Clorox Professional Products Company and Ketchum Research Findings (August 2016). (Online survey of 402 cleaning industry decision makers and end users across various industries.)

Clorox® Odor Defense™ Spray is a new product from Clorox Professional Products Company that is scientifically formulated to identify and capture odor-causing molecules and is proven to eliminate — not just mask — the toughest odors found in commercial settings. The full line of products include Clorox® Odor Defense™ Aerosol Spray, Clorox® Odor Defense™ Air and Fabric Trigger Spray and Gallon Refill, which can be used daily to control odor on soft surfaces and in the air, as well as Clorox® Odor Defense™ Timed Metered Aerosol Spray, designed to remove recurring malodor in trouble areas like restrooms. For more information, visit CloroxProfessional.com.





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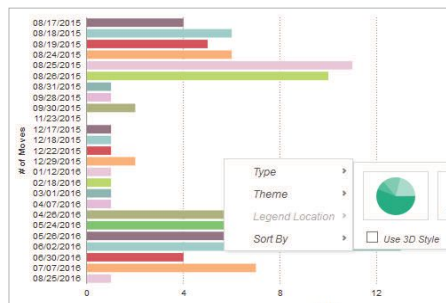
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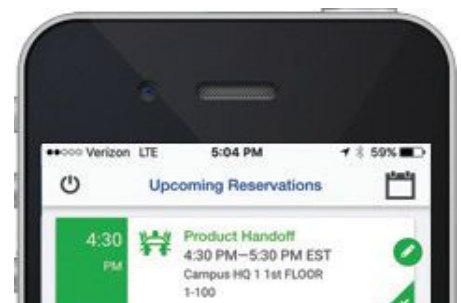
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IFMA Establishes Boards for World Regions



LEFT TO RIGHT: Bill O'Neill, Peter Ankerstjerne and Graham Tier at RICS headquarters in London, UK, January 2017

Americas Regional Board

GEOGRAPHIC REGIONS

North America, South America

GLOBAL BOARD LIAISON

IFMA First Vice Chair Bill O'Neill, CFM

Asia-Pacific Regional Board

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GLOBAL BOARD LIAISON

IFMA Second Vice Chair Graham Tier, CFM, FMP, MRICS

Europe/Middle East/Africa (EMEA) Regional Board

GEOGRAPHIC REGIONS

Europe, Middle East, Africa

GLOBAL BOARD LIAISON

IFMA board member Peter Ankerstjerne, MBA, COP, FRICS, IFMA Fellow

A key goal of IFMA's collaboration with the Royal Institution of Chartered Surveyors (RICS) is to provide a larger global platform to support IFMA members. As the organization develops this direction, the board of directors and senior leadership team recognized the need for an international governance platform to move IFMA to the next level in becoming a global organization.

In response to this need, IFMA has established three regional boards: the Americas Regional Board, the Asia-Pacific Regional Board and the Europe/Middle East/Africa (EMEA) Regional Board. Flowing into IFMA's global board, the new regional boards provide global governance and input into the organizational direction by providing regional representation, visibility and support.

REGIONAL BOARD GOALS AND OBJECTIVES


The goals of the regional boards include:

- Supporting IFMA's efforts to improve communication with members
- Aligning the association's strategic direction
- Introducing IFMA to a global audience
- Creating valuable networking opportunities and events for our members and other built environment professionals

The key objectives are:

- Cascade the global strategy to the various regions
- Gain market insights and intelligence into regional challenges
- Develop plans to meet the regional requirements to advance the FM profession
- Provide feedback to align programs and events with the global programs and objectives
- Raise the profile of FM in the region and act as ambassadors for the profession
- Assist in defining FM for the region, including the training and standards required
- Participate in regional stakeholders' engagement sessions in public and private sectors to provide an FM perspective

The initial structure for the regional boards was approved by IFMA's global board of directors in July 2016. The regional boards will each create bylaws that align with the management objectives of the organization, such as membership and credentials statistics and targets. They will provide regional advice and input into various programs and how to make them successful in specific areas of the world. They will also raise awareness of and support programs such as the IFMA Foundation's Global Workforce Initiative, and the IFMA-RICS unified career path and define.fm campaign.

Watch the What's New area of ifma.org for a complete list of regional board members. 

IFMA LAUNCHES IOT PORTAL FOR FMS

BY NANCY JOHNSON SANQUIST

Technology is drastically changing the way we work (and will be working in the not-too-distant future). IFMA wants to ensure that those of us in the facility management field are on top of these developments in this age of acceleration of technology in every aspect of our lives.

The changing expectations for planning, managing, operating, owning, financing and maximizing the world of the built environment have made the role of facility managers more strategically important than ever before. We are in the age of the smart building, smart campus and smart city, but we find that with all this “digital intelligence” there can be a performance gap between what is expected and actual results.

The Royal Institution of Chartered Surveyors noted in its publication, *Sustainable Construction: Realizing the Opportunities for Built Environment Professionals*, “There is substantial evidence that buildings do not perform as anticipated in the design stage. Post-occupancy evaluations showed that actual energy consumption in buildings was often twice as much as predicted.”

A primary cause of this performance gap is a failure to account for the FM professionals who need to analyze and interpret the vast quantities of data generated by smart buildings. Smart buildings require smart, trained people to run them in order to achieve the optimal operational potential.

KNOWLEDGE EXCHANGE ON TECHNOLOGY IN THE BUILT ENVIRONMENT

To address this need, IFMA has launched an online portal for FM professionals to be part of a community in which we can develop, exchange and disseminate knowledge about built environment technologies. Currently the focus is around the Internet of Things.

The IFMA portal provides a central hub to gather knowledge on all the new technologies being deployed or envisioned for the future of the built environment, such as the Internet of Things, artificial intelligence, the cloud, big

Smart buildings require smart, trained people to run them in order to achieve the optimal operational potential.

data and analytics, robotics, three-dimensional printing and many more. It’s an exciting time for facility managers to be able to understand these technologies, get the right training to deploy them in pilot projects and use them to change the way we work in all aspects of the built environment.

The first discussion on this concept will be held at IFMA’s Facility Fusion Conference and Expo in Las Vegas, Nevada, USA, on April 5. Darrell Smith, director of central services for Google and member of IFMA’s global board of directors, will lead a panel discussion on “IoT and Technology Application in the Built Environment.” He’ll outline activity on the site to date and the future ideas around this new community of professionals. In the meantime, email iot@ifma.org if you’d like access to the portal. **FMJ**



NANCY JOHNSON SANQUIST, AIA

Associate, IFMA Fellow, is vice president of global strategic marketing at Planon. An internationally recognized specialist with 25 years of diverse experience in corporate real estate and facility management, Sanquist is a leader in the field and created the first seminar for IFMA more than 20 years ago.

She has contributed substantially to the research and development of CRE and FM through her many written works, including the award-winning IFMA Foundation publication “Work on the Move” and its sequel, “Work on the Move 2.” Additionally, she serves on the foundation’s board of trustees.

Members of IFMA's chapters, councils and communities represent IFMA and the FM community worldwide. See what IFMA's members and components are doing to promote FM in their networks.

FROM OUR CHAPTERS

FACILITY FUSION U.S.

Las Vegas, Nevada | April 4-6, 2017

“The Nevada Chapter of IFMA is pleased to serve as a Facility Fusion U.S. host for the first time in the event's history! Join us at Caesars Palace this April and catch up with members of IFMA Nevada throughout the expo floor.”

— JERRY ZIMMERLE
IFMA Nevada Chapter President

WORLD WORKPLACE ASIA

Hong Kong | 9-10 May, 2017

“IFMA Hong Kong is honored to have World Workplace Asia return to Hong Kong for the third time since its launch in 2011. We will be celebrating the prestigious 25th anniversary of our chapter and co-hosting IFMA's Asia Pacific Awards of Excellence, honoring the outstanding achievements of facility professionals in our region.”

— MR. SAMSON LEE
IFMA Hong Kong Chapter President

FACILITY FUSION CANADA

Toronto, Ontario | May 17-18, 2017

“IFMA Toronto was the first IFMA chapter established outside of the United States and the first IFMA chapter in Canada in 1982. This year, as IFMA Toronto turns 35 and Canada turns 150, we are very excited to serve as the host chapter for IFMA's 2017 Facility Fusion Canada! Building off of the great momentum that Fusion Canada has had in Ottawa, Vancouver, and Montreal, we hope to make this the biggest and best yet.”

— NICK HEIBEIN
IFMA Toronto Chapter President

WORLD WORKPLACE EUROPE

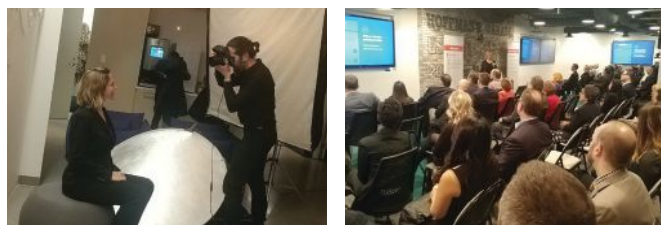
Stockholm, Sweden | 30 May-1 June, 2017

“IFMA Sweden is delighted to serve as host chapter for the inaugural World Workplace Europe Conference and Expo of IFMA in collaboration with the Royal Institution of Chartered Surveyors. We invite you to join us at Stockholm's Brewery Conference Center for a focused and intimate gathering of FM industry delegates.”

— ERIK AHR SJÖ
IFMA Sweden Chapter President

IFMA TORONTO TALKS WORKSPACES, BRANDING WITH LINKEDIN

The Toronto Chapter of IFMA held their February 2017 networking event at LinkedIn's beautiful new office in Toronto, Ontario, Canada. Attendees enjoyed a tour of LinkedIn workspaces, complimentary professional headshot photography by Michael T Photography & Design Inc., and targeted instruction from LinkedIn's Customer Success Manager Andrea Webb who discussed how to use LinkedIn for profile enhancement, brand development and knowledge sharing.



IFMA NYC AWARDS OF EXCELLENCE

The New York City Chapter of IFMA hosted its 2017 annual Awards for Excellence Dinner on Jan. 26 at The Pierre Ballroom in New York City. More than 400 guests attended the sold-out dinner to celebrate local IFMA members and their companies for their outstanding accomplishments over the past year. See photos from the annual IFMA NYC Awards of Excellence Dinner at <http://bit.ly/2I03p5q> and review the list of award recipients at www.ifmanyc.org/winners.



TOP LEFT: Ross David Weiner, SLCE Architects; Harry Cannon, SDM Metro; Edward Sanders, HiTouch Business Services; Jessica Bogdan, Innovant; Jay Feiertag, FEDCAP; Matt Korytko, Avison Young; Yasaman Hoorazar, HOK; Christine Chavez, Knoll, Inc.; James Camille, BlackRock; Colleen Moran, Time Inc.; Kristen Beck, Avison Young; Dan Castner, BAM Studios; Brett Kaplan, Haworth; J. Strong, Arenson.

BOTTOM LEFT: Cassandra Charles, Focal Point; Gary Anzalone, Razor Consulting; Gail Frank, Superior Office Systems; Mindy Williams-McElearney, L&K Partners.

Share the accomplishments of your chapter, council, or community in FMJ Extended — the exclusive online section of IFMA's official magazine! Send a brief snapshot that captures your component's dedicated work toward activities like FM advocacy, volunteer work, events, member recruitment and more to **Emily Bennett** at emily.bennett@ifma.org.

IFMA'S KNOWLEDGE LIBRARY

CREATED WITH FMS IN MIND



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The Knowledge Library delivers valuable knowledge sharing to facility professionals. In fact, Knowledge Library users have already downloaded

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resources since our launch at IFMA's 2015 World Workplace U.S. Conference and Expo! Visit us on the expo floor at IFMA's 2017 Facility Fusion U.S. Conference and Expo for a live demo of the online Knowledge Library.

WHAT WILL I FIND IN THE KNOWLEDGE LIBRARY?

You'll find 10 different types of content, from webinars and how-to guides to research and benchmarking, all organized by competency and industry for easy browsing. The Knowledge Library contains content from FMJ magazine, IFMA's member groups and IFMA Corporate Sustaining Partners, as well as FM and related industry organizations like the Royal Institution of Chartered Surveyors.



Go to page 29 in this issue to browse selected operations and maintenance content from our many contributors.

GET INVOLVED

CONTRIBUTE IFMA relies on FM experts (like you!) to stock the Knowledge Library with new and forward-thinking content to help facility professionals do their jobs better. Create, submit and get published — learn more at submit.ifma.org/submit.

REVIEW Published content is also reviewed and vetted by leading FM industry professionals, our Knowledge Library Content Experts, to ensure the highest standards of quality and relevance. Contact IFMA's Content Strategist Danielle Francisco at daniellefrancisco@ifma.org to learn more about becoming a Content Expert.

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www.hidglobal.com/smartbuilding
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www.garlandco.com | +1-800-321-9336

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