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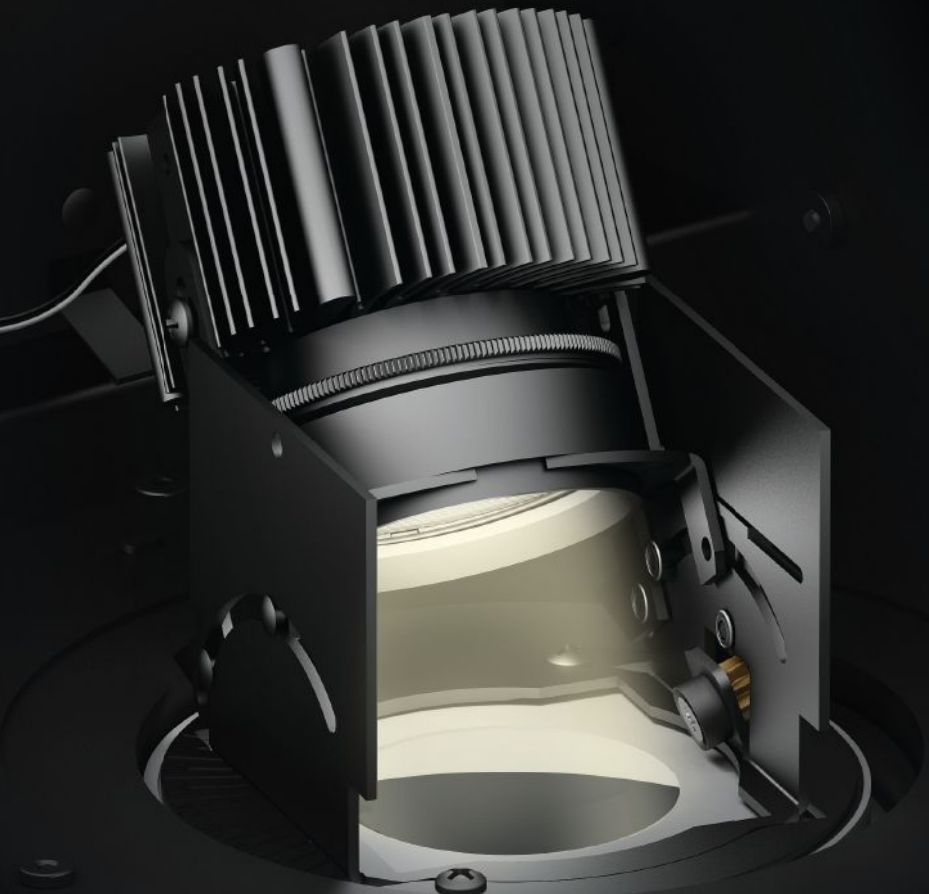
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VF100

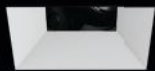


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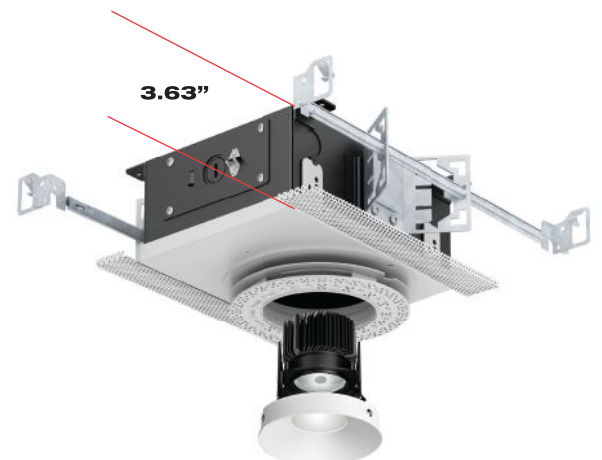
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The VF Series



The VF Series

MINI Housing



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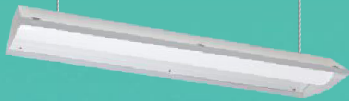
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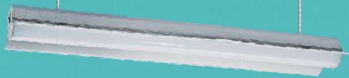


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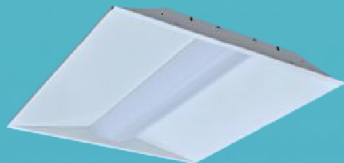
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Cline Bettridge Bernstein's lighting design for a landmarked New York City building anchors it on Union Square and transforms it into an illuminated reference point for the area.

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A comprehensive renovation, more than two years in the making, sets a new benchmark for museum gallery lighting.

Leo Villareal's LED light sculpture at the Renwick Gallery.

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On the Cover: The Daryl Roth Theatre, New York

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TRADE SHOW TRANSFORMATIONS



The lighting community has just completed another trade show season. But, while all of us were busily networking and checking out new product introductions, I couldn't help but wonder: As the industry evolves to keep pace with changing technologies, do our trade shows and conferences need to follow suit? The question has been on my mind since Lightfair 2015 in New York, where I acutely felt a changing of the guard, so to speak. The shift in the industry was clear, in both business and technology. It was evident in conversations with other attendees, but not in the presentation of products.

Today, lighting is more than a source and a fixture; it's a complex set of tools and applications that use lamps and luminaires as delivery vehicles. With the Internet of Things working its way into lighting, much of what is developing now is about functionality, control, and data gathering. It's not all about a new shape or finish; that's the old way that products debuted. Now, you need to view the luminaire in action, often as part of a larger system, to see what it's really capable of.

So it was with great interest that I started the grand trade-show tour this spring: in March, Light+Building in Frankfurt and LEDucation in New York, then on to Lightfair 2016 in San Diego in April. These three events showcase the industry's diversity and the importance of different types of venues and experiences for attendees. There is no one right or wrong format. If anything, the different scale of each show provides the lighting community with an abundance of choice. From an elaborately fitted-out, 1,600-square-foot stand to a simple skirted tabletop along a hallway, every presentation style and attendee experience has its own value.

No matter the level of spectacle involved, the manufacturer displays still fundamentally revolve around presenting the products as objects. I can't help but wonder if there isn't a new type of format that would better showcase the complexity of today's lighting tools?

For example, what if displays incorporated

more project vignettes? Lighting showcases could be created using environments in which different manufacturers could install their products. For instance, in an office mock-up, you could have a downlight from one company, a direct/indirect fixture from another, lighting controls from another, and so on. Designers could walk through these installations and see the lighting in action. Then they could follow up at a particular manufacturer's stand. This would be particularly welcome for outdoor lighting fixtures, which can never be installed at the proper mounting height or operated at full power in a trade show booth.

And then there's virtual reality. Social media has been a big help in the marketing of products, but what if one could attend a trade show as a virtual attendee? Not everyone can get to every show, but virtual reality platforms can allow lighting designers to interact with manufacturers remotely, and in real time.

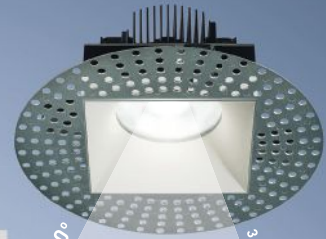
Whether the interaction is in person or online, the fundamental challenge remains: How do you connect with industry colleagues to create a meaningful and informative experience, from which you can take usable information?

Change is difficult, especially when you're used to doing things a certain way. But it would be a shame if the lighting community didn't investigate the opportunities associated with new presentation formats, digital tools, and exhibition designs. Lighting technology has evolved; there's no reason why its trade shows shouldn't also. •

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SHALLOW 4" HOUSING



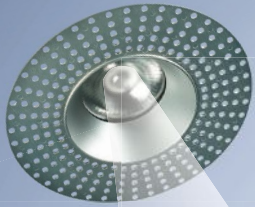
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33RD ANNUAL IALD INTERNATIONAL LIGHTING DESIGN AWARDS

This year's IALD International Lighting Design Awards were presented the evening of April 27 during Lightfair in San Diego, at a reception held at the San Diego Air and Space Museum. Seventeen projects—three Awards of Excellence, 13 Awards of Merit, and one Special Citation—were selected by the jury of architecture and lighting design professionals from a field of more than 200 entries from around the world. The Radiance Award, which is the program's highest honor and elevates one of the Award of Excellence winners, went to Tillotson Design Associates for the Lincoln Square Synagogue in New York. Awards of Excellence were also given to the CEPSA Flag Petrol Station, in Adanero, Spain, by lighting design firm Aureolighting, from Madrid, Spain (shown here); and the Artron Wall, in Shenzhen City, China, by lighting design firm Originator Lighting Design Consultants, from Taipei, Taiwan. For a full list of the IALD's winning projects go to bit.ly/AL_IALDAwards16. •

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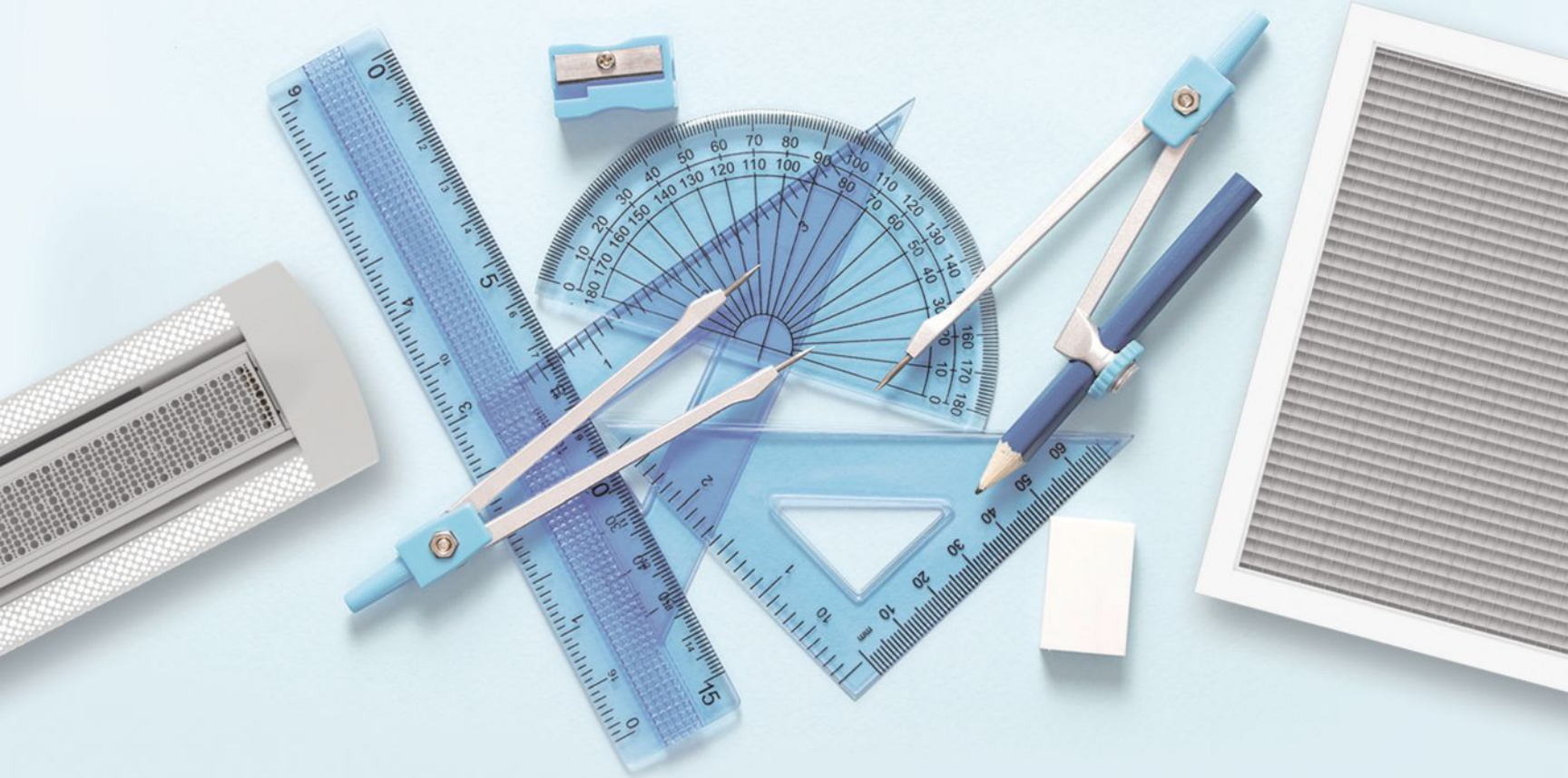




LUCEPLAN'S COSTANZA TURNS 30

Luceplan is celebrating the 30th anniversary of its iconic lamp, the Costanza. Designed in 1986 by architect and company co-founder Paolo Rizzatto (above), the design has stood the test of time—and technology. In 2014, the luminaire was updated to incorporate an LED module and the incandescent version was taken out of production. Rizzatto designed Costanza as an exercise in simplicity and as an attempt to reduce the table lamp to its basic elements: light, shade, and control. The luminaire features a self-supporting polycarbonate shade and has a touch dimmer. Since the original debuted, the company has expanded the luminaire family to include a range of sizes, finishes, and shade colors. Luceplan has yearlong festivities planned to celebrate the lamp, which commenced in the company's Milan showroom during the Salone del Mobile 2016 from April 12 to 17. bit.ly/AL_Constanza30 •

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OBSERVATORY OF LIGHT

The Fondation Louis Vuitton, overlooking the Bois de Boulogne in Paris, is hosting a new site-specific work from French conceptual artist Daniel Buren titled "L'Observatoire de la Lumière" (Observatory of Light), which opened on May 11. Buren conceived of the piece with the Frank Gehry-designed building's signature design element in mind—the 12 "sails," composed of 3,600 glass panels. Buren's artwork uses colored filters, in 13 different shades, which are positioned at an equal distance from one another across the glass structure. White-striped panels, which act like fritted patterns, and clear panels are also positioned intermittently. Depending on the time of day and the season, the filters will interact with natural light to create a play of color, projection, reflection, transparency, and contrast, transforming the building into a living kaleidoscope. The installation remains on view through the end of 2016. bit.ly/AL_Buren_FLV

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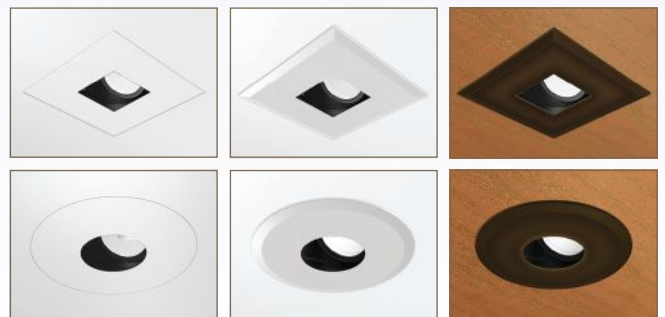


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The X Diamond 3/60, by Stickbulb, was on view during the International Contemporary Furniture Fair (ICFF) in New York from May 14 to 17. The piece is composed of 60 3-foot-long illuminated wood segments connected by 36 cast brass joints. The second in a limited edition series of 25, the version shown during ICFF was constructed from reclaimed Southern yellow pine collected from demolished New York City buildings. Stickbulb was co-founded in 2012 by Yale School of Architecture graduates Christopher Beardsley and Russell Greenberg to focus their interest in architecture, modular systems, and sustainable manufacturing. A modular LED system from reclaimed or sustainably sourced wood, Stickbulb is an extension of Greenberg's design company, RUX, which he started in 2008. bit.ly/AL_Stickbulb

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FROM NETS TO NETWORKS

The aerial artwork of Janet Echelman.



Janet Echelman's 2015 London installation "1.8" was suspended over Oxford Circus.

text by Mimi Zeiger

Artist Janet Echelman creates extra-large, jellyfish-like sculptures—colorful net structures that compete with the size of buildings. Yet, to merely refer to their monumental scale is to ignore their subtle and surprising dynamic details. Her artworks aren't set in stone; instead, they hang in the air, responsive to the wind. Each sculpture, made of ropes tied into netting with tens of thousands of often hand-tied knots, casts an ever-changing pattern of shadows on the urban environment.

Last year, Echelman suspended the nearly two-block-long piece "As If It Were Already Here" over Boston's Rose Fitzgerald Kennedy Greenway for six months. Weighing nearly a ton and made out of hand-spliced ultra-high-molecular-weight polyethylene and braided high-tenacity polyester fibers, Echelman's artwork hung from the façades of surrounding buildings and formed a delicate canopy over the park below. At night, RGBW 100W LED floodlights cast a changing wash of colored light onto the 600-foot-long by 300-foot-wide structure. The design team hid the lighting equipment in plain site in the urban fabric. Mounted on the surrounding building canopies and streetlights, the 44 fixtures were linked by a custom DMX control system with wireless repeaters. The Rose Fitzgerald Kennedy Greenway Conservancy commissioned the roughly \$1.25 million installation as part of the organization's public art program to draw people to the park. The gamble paid off. "People would lie down in the grass and watch the sculpture change and billow in the wind," Echelman says.

The impact of her designs comes not just from their beauty, but also from how people respond to them—often by losing themselves in the moment, albeit a public moment. This winter, when she installed "1.8" over Oxford Circus, Londoners found themselves braving the chilly temperatures in order to take it in. "On the coldest week of the year, we closed the busiest street and people were lying down on the cold asphalt to have the experience of contemplating the world unfolding above them," Echelman says, adding that she was among the brave throng. "It is very important to me that my work be a dynamic experience rather than a static experience."

That dynamism emerged from her practice over a number of years—beginning as fluid brushstrokes before evolving into large-scale kinetic sculpture. Her biography suggests a correlation between how she was making art and where she was making it. In the late 1980s, she studied



While a Fulbright Scholar in India, Echelman was inspired by the local fishing culture in the village of Mahabalipuram and she began experimenting with nets to make temporary structures such as “Red Hot” (above). Made of cast bronze, sewn cotton net, Bāndhani-dyed silk, and galvanized steel, the piece is 65 feet long by 11 feet wide and tall.

Chinese calligraphy in Hong Kong. Then, she collaborated with Indonesian textile artisans in Bali. Finally, in the late 1990s, while on a Fulbright fellowship in India, she was inspired by the nets of village fisherman in Mahabalipuram. Those nets provoked a pivotal change in her work. Rather than suggesting movement, form, and light through ink, paint, or sculpture, she could capture natural forces at play in real time. The result was a series of modest anticipatory works made out of local materials that seem almost like rough sketches for the work to come.

The traces of those nascent experiments—her openness to collaborate with craftspeople and her hand-tied net sculptures hung from wooden poles—still resonate in her studio’s most ambitious efforts. Works throughout the 1990s and early 2000s grew in scale and finesse, growing from the size of the human body to the size of a building. A 2001 piece, “Target Swooping Down ... Bullseye!” which was installed in the courtyard of the Spanish National Trade Fair Complex in Madrid caught

the eye of the late architect and urbanist Manuel de Solà-Morales, who invited Echelman to create her first work at an urban scale on the border of Matosinhos and Porto, Portugal. That piece, entitled “She Changes,” set the stage for how Studio Echelman operates today. Her artistic vision is supported by collaborations with multiple consultants including software companies, engineers, lighting designers, and fabricators.

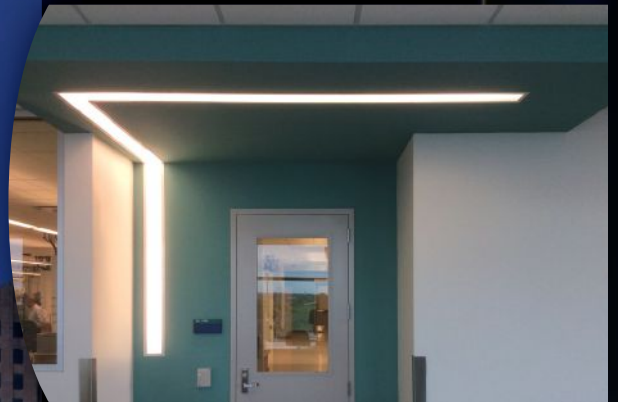
Despite the move to the monumental, Echelman’s desire to create artworks that speak to the whole of a city continues to be rooted in craft, even if that craft has now expanded to incorporate digital processes. She describes her sculptures as custom garments for the city, and she jokes that hers is an artisanal practice—“as if your grandmother knit you a sweater.” Indeed, each piece combines preindustrial handwork, industrial loom technology, and postindustrial computational soft body modeling. She asks herself, “How do you keep the beauty and idiosyncratic [nature] of handmade production

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Echel­man's studio in Brookline, Mass.

while bringing [it] to a monumental scale and robust engineering suitable to withstand the climate year after year?"

The answer comes from the studio's in-house process, specifically in its relationship to technology. Handmade models fill the Brookline, Mass.-based studio. "There are a lot of things that you can't do in the computer. You can't sketch with a piece of wire on a model or drape a fabric," says Echelman, who is quick to note that she's indebted to computational counterparts—sophisticated 3D models and renderings—to get her visions realized. Echelman and team are engaged with Autodesk in a five-year project (the company reached out after the artist's 2011 TED Talk) to create custom software that responds to the particular parameters of the suspended artworks, a variation on the company's JNet tool that works in conjunction with the 3D modeling software Maya. The custom software allows the designers to accurately simulate dynamic parameters such as wind movement through the net in real time while they are designing. They can also model fabrication elements such as how the machines that knit the nets trim and cut panels, change bobbins, and vary color.

"There are many software packages where

you can draw fiction ... [and where] you can fall in love with the images on your computer," Echelman notes. "Ours is the opposite. We render things we know we can build according to our tools and materials."

In addition to computing natural and structural forces, digital tools allow the studio to model light for both day and night. For urban installations, Studio Echelman uses computer-controlled color LED floodlights, mounted close to the sculpture's surface, to amplify the volumetric effects of the artwork. The effect is close to seamless; the designers tuck fixtures behind building parapets or place them on rooftops, making sure to avoid glare into viewer's eyes as they gaze skyward. In 2014, Echelman collaborated with media artist Aaron Koblin, who was, until 2015, creative director of Google Creative Lab's data arts team, on the artwork "Skies Painted with Unnumbered Sparks." Designed to mark the TED Conference's 30th anniversary (Echel­man delivered well-received TED Talks in 2011 and 2014), the piece has an interactive component

that allowed viewers to control the lighting with a smartphone app. Koblin was able to design the lighting component directly within Studio Echelman's 3D model. As a spectator moved his or her phone, a beam of light would dance across the suspended sculpture—a bright manifestation of the titular sparks.

"For years, the industry has been talking about computer-aided design versus computer documentation," Echelman says. "But that [is] not the way ideas develop or how the design process unfolds. We need fast results in the early conceptual stage, but when ready to do construction documents I need incredibly accurate data." This data includes information about the real spaces in which she is installing her work. For the Boston installation, the team used a 3D digital scan of the city to precisely model and position the anchor points for the pre-stressed rope structure—these included among other things an old arsenal and an old smokestack. "I was drawing lines in the city—it was a loose exploration of real space," she says.

Last year, the Smithsonian American Art Museum in Washington, D.C., asked Echelman to create a piece for the Renwick Gallery's Grand Salon as part of the "Wonder" exhibit. The



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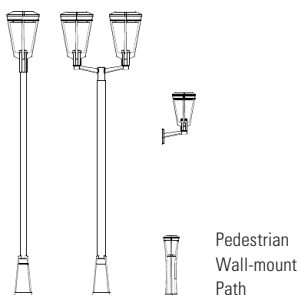
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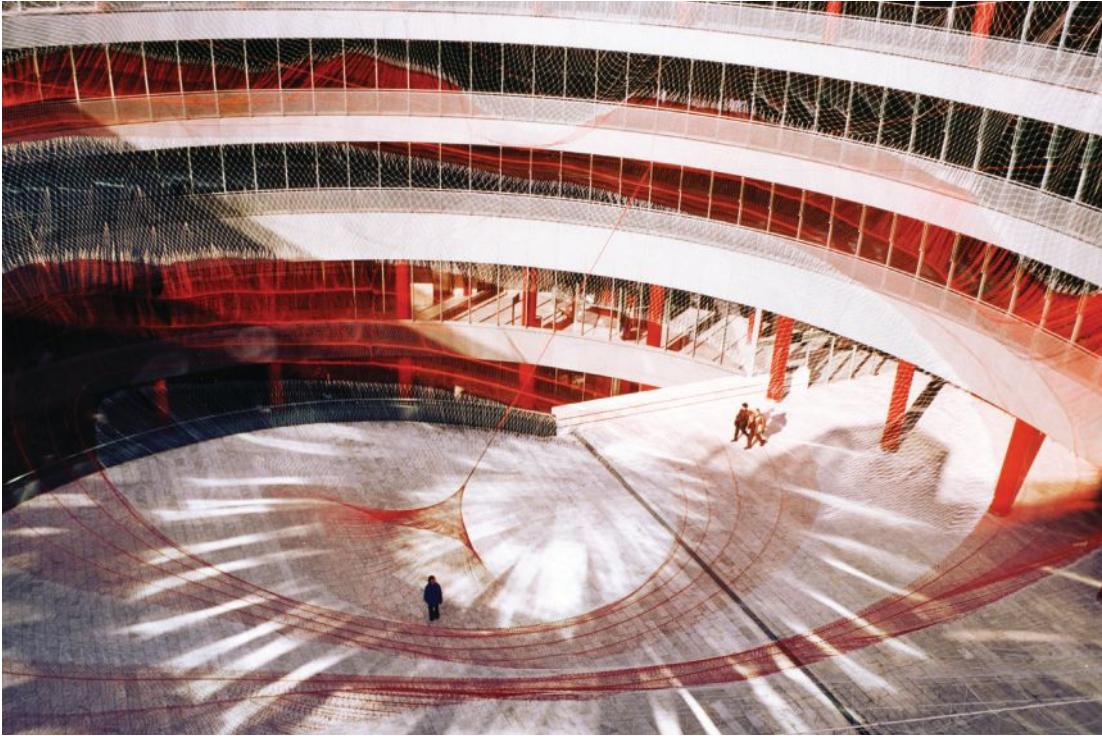
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In 2001, Echelman designed "Target Swooping Down ... Bullseye!" The 135-foot-wide by 90-foot-tall nylon lace net was attached to the perimeter of the atrium in the Spanish National Trade Fair Complex in Madrid (left). "Skies Painted With Unnumbered Sparks," was designed in 2014 for the 30th anniversary of the TED Talks (below). The 745-foot-long artwork was installed in Vancouver, Canada.



Top: courtesy Studio Echelman; Bottom: Erna Peter

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PROFILE

commission posed a challenge to the artist who was used to working outdoors: Although large, the 100-foot-long gallery didn't have the same active forces—no wind, no sunlight. She turned to Brian Stacy, principal and Americas lighting leader at Arup's New York office, to help create shadow drawings along the salon walls and color washes across the sculpture. "I used to be a painter," Echelman says, and "this translation from three-dimensional sculpture into two-dimensional shadow drawings and color washes has a lot to do with the figure-ground dialogue in painting." The team used a seven-LED-chip light engine with theatrical-style fixtures that also allowed for good optical and glare control. The color-changing sequences for the artwork were run through a control system linked to the museum's smart control system. To simulate the motion of air in the room, in order to give the sculpture some dynamic movement, they utilized DMX control fans.

The piece—"1.8," like the London installation of the same name—inspired viewers to lay down on the floor and gaze up at the play of rope, shadow, and colors above. Also, like the London sculpture, the artwork references the 2011 Tohoku earthquake and tsunami that hit Japan, using data sets of the heights of the waves that raced across the Pacific Ocean. The title references the length of time, in microseconds, that the Earth's day was shortened due to the quake. For Echelman, the disaster highlighted the physical interconnectedness of the natural world—something we sometimes forget given our dependence on digital networks.

"The problems for us as human beings is that there are events that exceed our history and time," she says. "That's humbling for me. This work is about this humility and is about being a human being in a world at a scale that is beyond what we can comprehend." Her hope is, through her artwork, to create a meditation on time and how our connection to the physical world functions at scales beyond our control. It might seem like a lofty goal for an artist whose career began with humble materials in a village in India, yet for Echelman it is part of a continuum from the smallest hand gesture to the monumental urban works that make us wonder about our place in the world. •

"How do you keep the beauty and idiosyncratic [nature] of handmade production while bringing [it] to a monumental scale?" —Janet Echelman

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Before the retrofit, the installation used 206 fixtures at 33W each. The upgrade reduced the fixture count to 177 at 50W each. The new fixtures use only two or three colors at a time, however, cutting the overall wattage by up to 60 percent.

THE MAPPARIUM

text by Hallie Busta

The world today looks very different from the one depicted by the Mapparium, a three-story, luminous stained-glass globe at the Mary Baker Eddy Library, in Boston, which reflects the international landscape of the year it was commissioned: 1935. A recent LED overhaul and controls upgrade, however, now affords visitors a uniquely dynamic, immersive experience.

The library tasked Focus Lighting, in New York, with re-lighting the historic globe and implementing an advanced lighting controls system that allows staff to more readily create and deliver interactive tours. This is the latest renovation for the installation, which was first updated with LEDs in 1998. The massive, 26-foot-diameter globe is housed in a 30-foot-by-30-foot room. The existing 1998 luminaires were installed on the six horizontal, exterior rings comprising metal strut bolted to conduit clamped to the globe's steel structure, and they

reflected light off of the room's white walls, backlighting the stained glass.

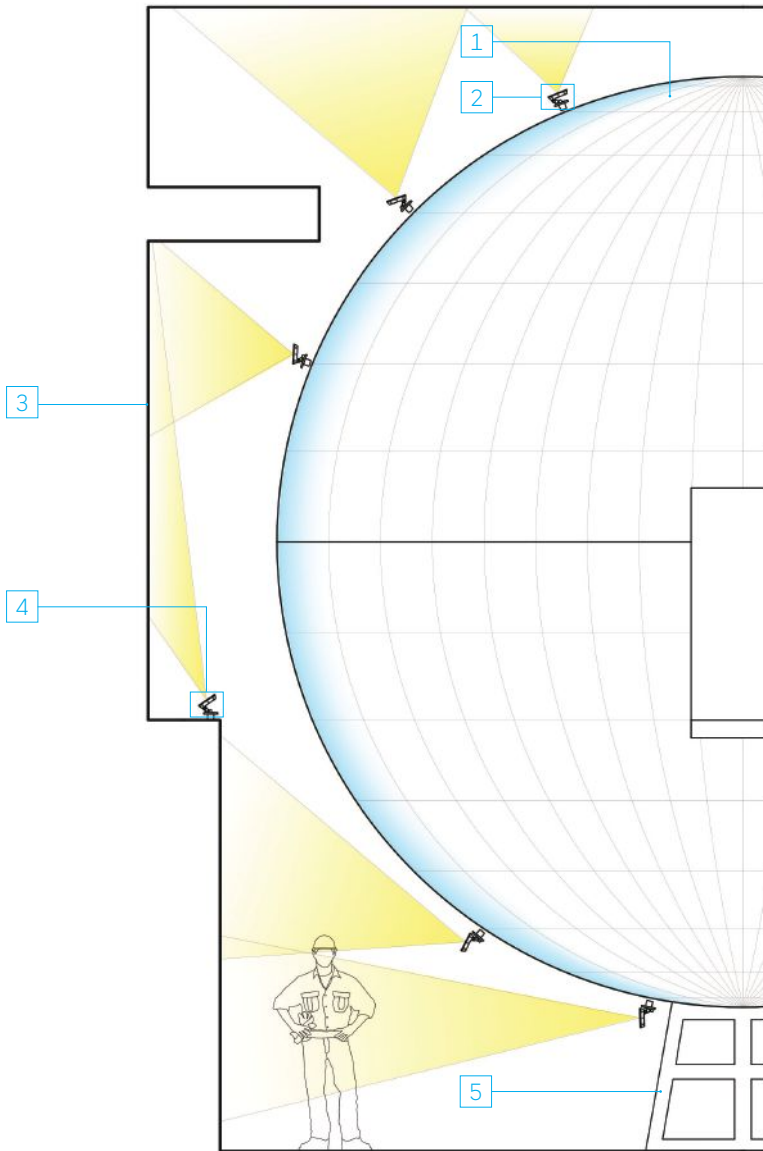
The library's request for better controls, however, necessitated a more precise lighting system. The team selected ColorBlast TRX luminaires with RGBW and amber LEDs to replace the existing ColorBlast RGB fixtures. The older fixtures were about one-third the brightness of current technology, says Focus Lighting principal Brett Anderson, while the newer luminaires include white and amber LEDs as well as a proprietary blue LED designed to bring out the blues and purples on the map, giving the team better control over what elements of the colorful globe were highlighted at a given time and which ones could be made to fade into the background.

"We had to be able to give the [library] the ability to have [the Soviet Union], for example, pop out from the background and be individually

recognized by [visitors]," Anderson says. The designers limited their use of white light, instead focusing on the saturated red, blue, green, and amber LEDs to visually separate the map's graphical elements. Additionally, an accessory holder on the front of the new luminaires allowed the team to experiment with diffusion and lens-shaping films when aiming the fixtures. The installation process was a team effort, Anderson says, requiring aiming adjustments to be viewed from the Mapparium's interior as they were being made. In all, the lighting retrofit cut the number of fixtures used to light the globe from 206 to 177.

Today, docents control the system using a tablet, choosing among themed and color presets as the building blocks for shows and to run existing programs that combine lighting, audio, and video—an integrated system that brings the historical globe into the present. •

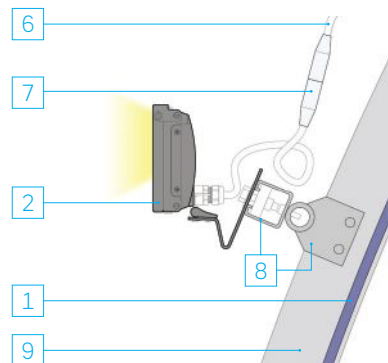
DIAGRAMMATIC SECTION-ELEVATION THROUGH MAPPARIUM ROOM



Legend

- 1 Stained glass globe
- 2 RGBAW LED floodlight mounted to existing metal strut structure
- 3 Walls of Mapparium room painted white to evenly reflect light
- 4 RGBAW LED floodlight
- 5 Globe base
- 6 Connectorized leader cable from remote power supply
- 7 Five-pin XLR power/data connector allows the floodlight to disconnect for maintenance
- 8 Existing metal strut and conduit clamp
- 9 Existing globe structural rib

LIGHTING DETAIL



DETAILS

Project: The Mapparium Relighting, Boston • **Client and Owner:** The Mary Baker Eddy Library at the First Church of Christ, Scientist, Boston • **Architect:** Chester Lindsay Churchill (architect for the original structure, completed in 1935) • **Lighting Designer:** Focus Lighting, New York • **Photographer:** Ryan Fischer, Focus Lighting • **Total Square Footage:** 600 square feet • **Lighting Costs:** Approximately \$176,000 • **Code Compliance:** Not Applicable • **Watts per Square Foot:** 1.1 watts

MANUFACTURER

Philips Color Kinetics: ColorBlast TRX luminaires with RGBW and amber LEDs for backlighting the globe • **Pharos Architectural Controls:** Control system for operating the LED lighting

REALIZING THE INTERNET OF THINGS

text by Wanda Lau

illustrations by David Preiss

The Internet of Things (IoT), in which everyday objects are made intelligent through sensors, microprocessors, and machine-to-machine communication, ascends into the Industrial Internet of Things when IoT objects are networked together to control large-scale systems, such as the lighting infrastructure of an entire city. But Joe Costello, CEO of tech startup Enlighted, in Sunnyvale, Calif., offered his own take on the phenomenon during his opening keynote at Lightfair's inaugural IoT & Smart Lighting Forum this year: He called it IQoT, after the intelligence quotient test. The networking of objects together should not only enable remote user control, he said, but also collect, process, and analyze data in an intelligent way. "That's when it's interesting," he concluded.

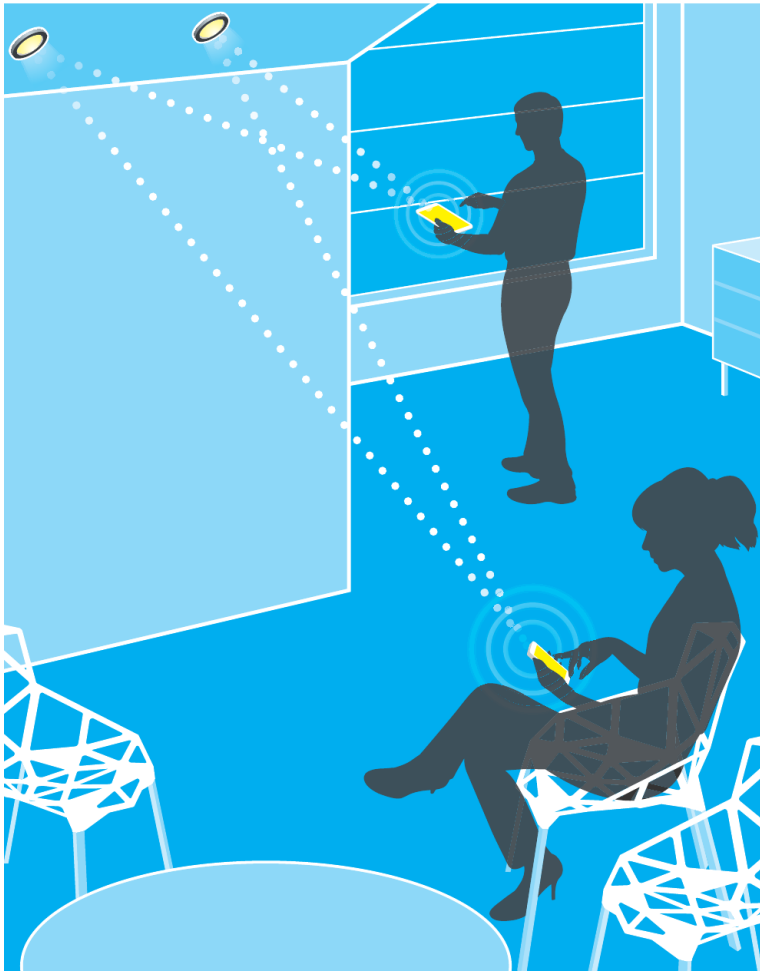
Enlighted was one of several companies at Lightfair exhibiting IoT technology that integrates into interior and exterior light fixtures, which in return provide IoT sensors power and an unparalleled position, literally, to see the environment around them. IoT does offer ample opportunities in lighting control, but more importantly, it offers the ability to track nonlighting metrics, such as building performance, human activity, and physical assets. For example, Costello noted, in a North American hospital, the average nurse spends an hour of each workday looking for equipment, which translates into wasted time and money, and even to unnecessary overnight stays for patients, who can only be discharged in wheelchairs, which frequently go missing.

Major lighting companies, including Current by GE, Philips, and Acuity, are now developing IoT platforms in partnership with technology companies such as Enlighted, Sensity Systems, and Daintree Networks (which is now a part of Current by GE), as well as companies with a major foothold in cloud computing such as Cisco, Oracle, and Microsoft. But the relatively

nascent IoT space has room for plenty of players, including the companies featured in this article that presented at the Lightfair forum about the areas of expertise they are tackling to take IoT from what may sound like a far-fetched future to a ubiquitous service that is being deployed today.

INDOOR POSITIONING POSSIBILITIES

Many presenters at Lightfair's IoT forum highlighted smart lighting's ability to continue where GPS tracking leaves off: at the building entrance. GPS, which relies on satellite information to triangulate a signal's location within 1 to 5 meters (3 to 16 feet), loses its accuracy once an individual—or more accurately, a GPS-enabled device, such as a smartphone—steps indoors. Because all smartphones operating on the Android or iOS



Lightfair's first-ever IoT & Smart Lighting Forum showcased the enthusiasm of established lighting companies and tech startups to make luminaires invaluable to an information-driven future.

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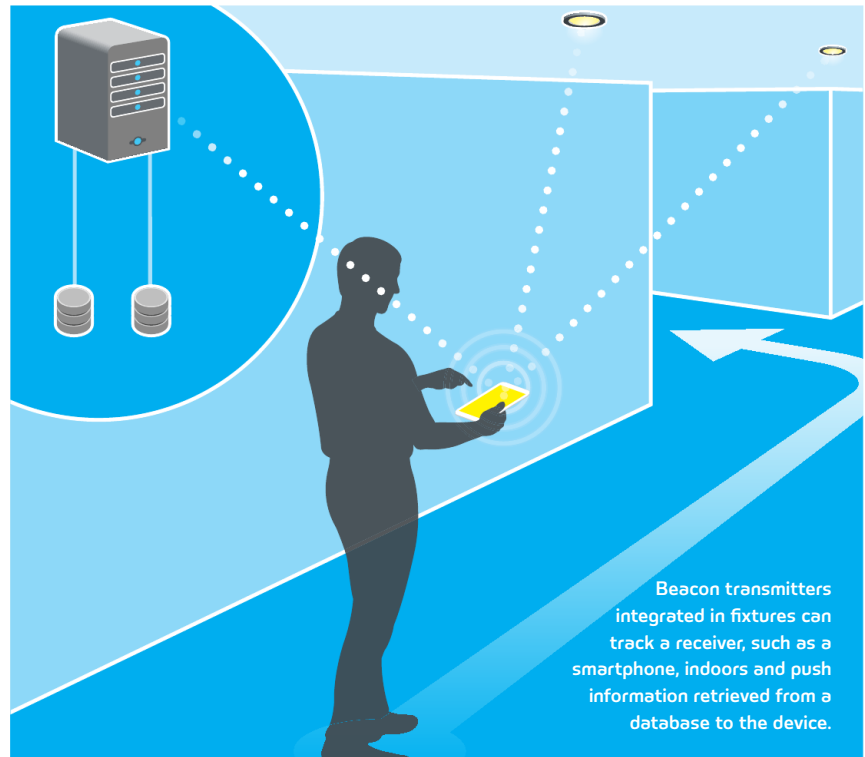
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platforms are Bluetooth and Wi-Fi enabled, a sensed lighting network would be able to continue to track the device within a couple of meters, opening the door to a whole new class of location-based apps—including the tracking of assets, such as those mysteriously misplaced hospital wheelchairs. (Visible light communication [VLC] offers accuracy to within a few centimeters, but it does require the receiving device to have a photodetector facing the signals.)

Belleds, a Cambridge, Mass.-based designer of smart-lighting products, offers a Bluetooth chip and module for LED fixtures that both enable wireless lighting control and broadcast the location of the fixture (this is also known as a beacon). As a smartphone detects the beacons in the luminaires, the device's location can be tracked to within the nearest meter or two, depending on the density of beacons in that area.

If a client wants only to use an LED fixture as a physical platform to install beacon technology without gaining addition lighting control, Belleds co-founder Alan Zhou says that integrating the chip simply requires tapping into the DC power supply for the LEDs. "Today, most of the



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Bluetooth Low Energy chips only consume a couple microamps during standby mode; and a couple milliamps during transmission, or active mode,” Zhou says, citing the lower-power and app-friendly version of the Bluetooth communication protocol.

If a client also wants wireless control of the lights, in addition to using them as beacons, Belleds offers a patented module—which installs between the LED driver and the diodes—that delivers both positioning information and lighting control, using pulse-width modulation, of an LED source’s four color channels (red, green, blue, and white) to produce any color from the luminaire, as well as on/off control.

Belleds also found a way to overwrite the control protocol that generally limits Bluetooth devices from pairing with more than one device, allowing multiple parties to access a building’s lighting system. “You can have the controls as well as the positioning all in one,” Zhou says.

POWER OVER ETHERNET POE-TENTIAL

Power over Ethernet (PoE) is becoming a more viable option to create smart lighting. The low-voltage distribution system delivers

a connection to the Internet and power to the luminaires—as well as other integrated sensors and control devices—over the global Ethernet standard. “If you plug something into a PoE switch, the power you’re going to get is universal,” says Lisa Isaacson, co-founder and chief business development officer of NuLEDs, in Carlsbad, Calif.

PoE-plus cables (CAT-5e or CAT-6) can deliver 30W, while Cisco’s Universal PoE (UPoE) cables can deliver 60W over the four pairs of twisted conductors within an Ethernet cord. “That’s a sweet spot for being able to [power] a wide assortment of LED fixtures [including] 2x2 troffers, 2x4 troffers, canlights, cove lights, and sconces,” Isaacson says.

The essential components of PoE system are: an uninterruptible power supply; a UPoE network switch, which detects whether to send power to the devices connected into its ports; and a PoE module, such as NuLEDs’ proprietary SpiceBox. The NuLEDs SpiceBox converts the incoming AC power to DC power for the LEDs and sensors plugged into it. It also assigns a unique IP address to each device, giving each of them the ability to broadcast its location and to receive

network information and control commands.

An advantage of PoE as an IoT technology is the safety it offers in electrical wiring: each light plugs into a low-voltage Ethernet port. “Instead of stepping down the power level at each and every fixture, you’re doing [the conversion] on one robust power supply,” Isaacson says. This also means that LED luminaires designed for PoE (NuLEDs currently has partnerships with Deco, US LED, and Fluxwerx Illumination) no longer need a discrete driver.

PoE also increases design flexibility because anyone can relocate a light fixture without the need to call an electrician. This also leads to one logistical challenge: Who is in charge of servicing the fixtures? Instead of calling the facilities department, building occupants would need to contact their IT department, who can then ping—or check the network connectivity of—a luminaire but may not be trained to troubleshoot the fixture itself.

ACHIEVING IOT’S PROMISE

Despite the promising technologies presented at Lightfair’s IoT Forum, the groundwork is still being laid for taking smart lighting from



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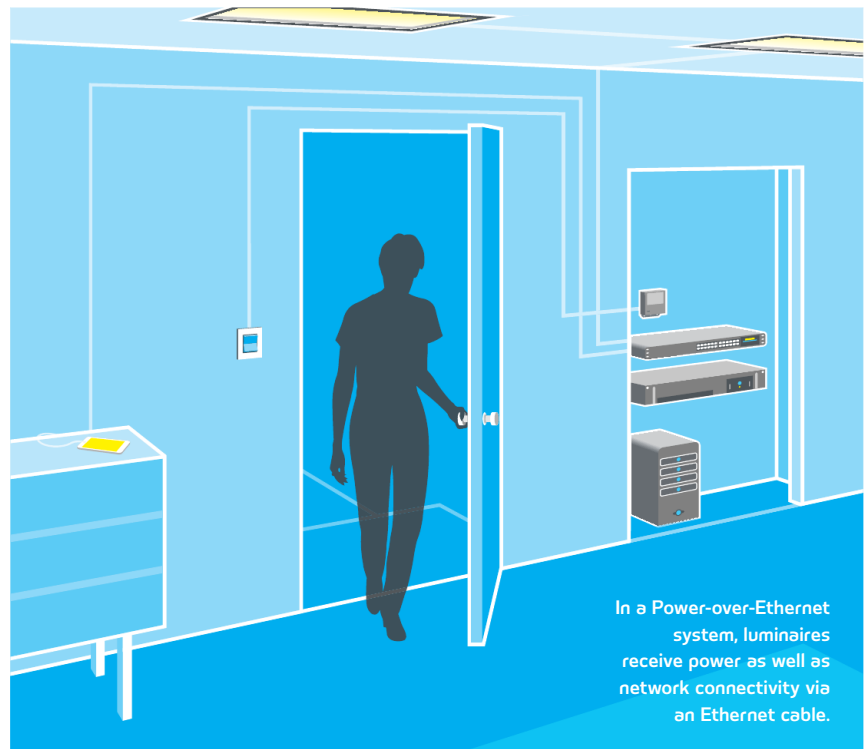
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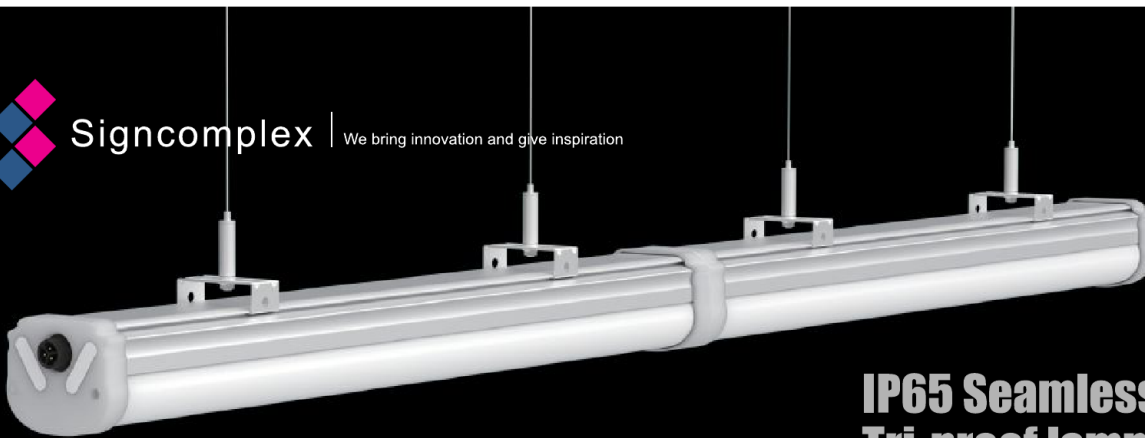
proof-of-concept to mainstream use. Many players in the field are now seeking to reach critical mass—deploying IoT devices on a large enough scale in order to gather the volume of data needed to entice app developers, and to test the reliability and security of the data. “The data streams and the apps that depend on them are where the value is,” says Enlighted founder and chief technology officer Tanuj Mohan. “The promise is huge, but you have to step in a little to understand the information and how accurate it is.”

During his Lightfair presentation, Brandon Davito, a vice president at San Francisco-based Silver Spring Networks, noted how Metcalfe’s Law also applies to IoT: the value of a network is equivalent to the square of the number of devices deployed.

Lighting designers working with clients interested in installing a smart-lighting network on their projects should ask them: first, what information do you want to know; and, second, why do you want to know it? For example, do you want to know how many people are in a conference room, or do you want to know who is in a conference room?



In a Power-over-Ethernet system, luminaires receive power as well as network connectivity via an Ethernet cable.



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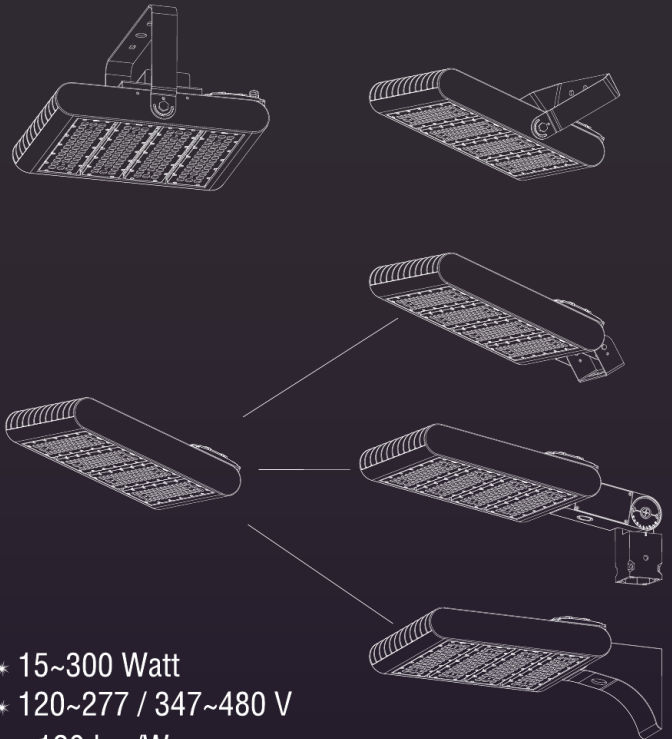
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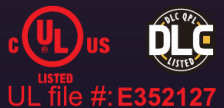
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TECHNOLOGY

Cost will no doubt play a role in which type of sensors are deployed and how quickly they are deployed. One way to save on expense is to install fewer sensors, Mohan says, which would give you coverage in specific zones instead of full coverage. Another way is to strategically choose what type of sensor to use. For example, you don't need a high-resolution imaging sensor for each IoT node if the only information you need is indoor-positioning data.

Mohan does recommend picking a system that is future-proof, to the extent possible. A sensor that "is built like a computer" and has "a processing unit with software that can be continuously upgraded" remotely, he says, will minimize the time and expense of going back up into a fixture.

Not surprisingly, all presenters at the Forum said that smart lighting represents a good investment. Because IoT-enabled fixtures can self-

“The data streams and the apps that depend on them are where the value [of IoT] is.”

—Tanuj Mohan, chief technology officer, Enlighted

commission, Kishore Manghnani, co-founder and CEO of Orama, in San Mateo, Calif., said teams can save as much as 60 percent in project costs immediately. Davito noted that an additional 10 to 20 percent in savings can be gained because of improved lighting controls, and then another 15 to 25 percent in reduced operation and maintenance expenses. This does not account for the improved energy efficiency of LEDs over conventional sources, nor for the more abstract savings reaped in benefits such as improved safety and space management. All in all, the return of investment (ROI) of upgrading the lighting infrastructure could be as quick as a couple years.

Mohan does caution decision makers and facility managers from prioritizing ROI in their selection of an IoT platform and system. He recommends that they ask this question: "Is my responsibility to the building or the humans in the building?" If the IoT system installed is optimized for the structure, but its occupants experience minimal improvements in productivity, happiness, or safety, he says, then the decision was likely made with the wrong metric in mind. •

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LIGHT+BUILDING 2016





Messe Frankfurt/ Pietro Suteria

text by Elizabeth Donoff

Light+Building, the week-long trade show that takes place every two years in Frankfurt, Germany, was once again a blockbuster display on a grand scale, featuring the latest in lighting products and innovations. It was one of the busiest Light+Building gatherings in a while, a sign that the economy has rebounded since the 2008 recession. And attendance numbers released by Messe Frankfurt, the fair organizer, confirm that: 216,000 trade visitors (up from 211,232 in 2014) from 160 countries, and 2,589 exhibitors (up from 2,495 in 2014).

The luminaires and technologies on display reflect an industry that has, at least for the moment, caught up with the pace of technological developments. While there was nothing earth-shatteringly new on display, there was enough to entice. Manufacturers seem to be more selective in how they allocate their research and development dollars now, and that means fewer, but more thorough, product introductions.

Overall, there continues to be product maturation and a greater comfort level with LEDs, by both designers and manufacturers. This has allowed some manufacturers to enter lighting segments in which they have previously not focused—such as Zumtobel moving into outdoor lighting. This year, the company debuted not one, but two, outdoor product lines: Supersystem Outdoor and NightSight, a luminaire family designed in conjunction with architect Ben van Berkel of UNStudio in Amsterdam (read our interview with van Berkel on page 50).

Collaborations of designers and manufacturers were in abundance. In addition to the Zumtobel–UNStudio pairing there were also collaborations between Reggiani and Speirs + Major with a new bulkhead fixture called Cells (see page 44), and between lighting designer Roger Narboni and French company Technilum

with a modular outdoor lighting system called Extimity (see page 46).

Color discussions took a more artistic view, as evidenced by “Color Wheels,” a light art piece by designers Aleksandra Stratimirovic and Athanassios Danilof on display at Targetti’s stand (bit.ly/AL_ColorWheels). Compared to recent discussions in the U.S., TM-30 seemed less of a buzzword for the European lighting community.

Very few U.S. companies have historically exhibited at Light+Building. Those that do—such as San Antonio-based Lucifer Lighting, who kicked off its 2016 product launches in Frankfurt (see page 46)—achieve great reach with the international design community as a result.

After iGuzzini’s successful introduction of Laser Blade in 2014, it seems the entire industry has followed suit with slim-profile, recessed linear wallwashing fixtures. The company has also excelled in how it presents its products. (Turn to page 48 to read our discussion with company vice president Massimiliano Guzzini about how the concept for the Light Experience came about.)

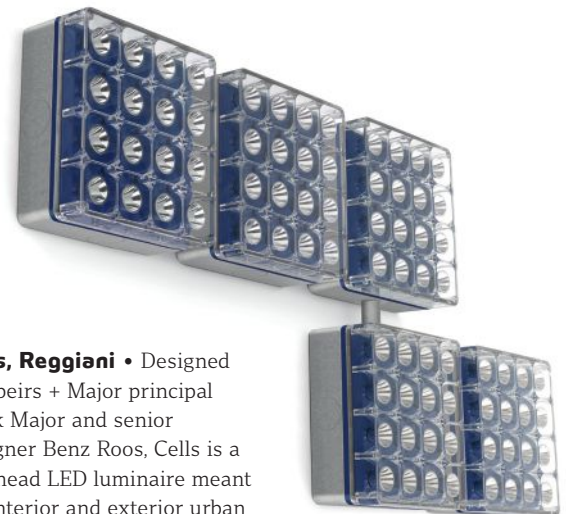
With the lighting industry in flux the past few years, it was interesting to see how companies such as Philips and Osram handled their displays and their corporate messaging. During its press conference, Philips would not answer any questions regarding the sale of the lighting business. The same was true for Osram, who did not discuss the “carve-out” of its general lighting lamps business under the name Ledvance.

But no matter what’s new or what the latest social media trends might be, when it comes down to it, fairs like this are still, at their core, about lighting. And why is that? Because lighting designers around the globe share a universal concern: how to maintain focus on quality of light no matter technology developments and energy efficiency requirements. •

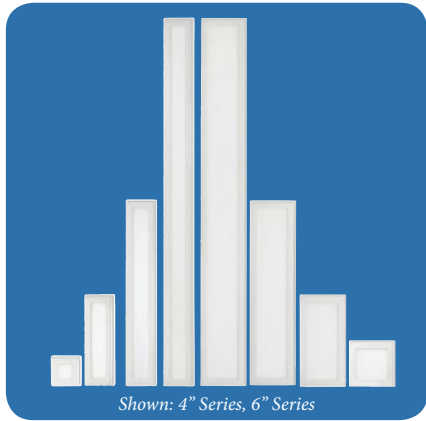
OLED Flexible Light Panels, LG Display • LG Display showcased 11 different OLED modules in varying sizes and color temperatures. To communicate the flexibility of OLEDs, the company showcased four lighting solutions: Flexible; Glass with Transparent Connection; Mirror; and Module. For the Flexible solution, the company created decorative and pendant lights (shown) using the largest available flexible OLED light panel on the market, 320mm x 320mm (17.8" diagonal). It is available in three color temperatures—2700K, 3000K, and 4000K—uses 13.6W and 15W respectively, and has a CRI of 85-plus. • lgoledlight.com



45 HC, CoeLux • CoeLux lighting systems reproduce the effect of natural sunlight in an integrated ceiling against a backdrop of a clear blue sky. On view in Frankfurt was the company's 45 HC skylight, which features a 45-degree solar elevation angle to mimic Mediterranean lighting conditions. This virtual experience that simulates the appearance of the sun and sky through a 16.1-square-foot window is designed for a dropped ceiling, and requires a recommended area of 215 square feet for installation. The skylight itself weighs 660 pounds and the opening is 67" by 33.5". The LED source is not dimmable, uses 350W, and requires a 100V–240V input. The skylight delivers 2,000 lux at 1 meter, 1,300 lux at 2 meters, and 900 lux at 3 meters. The 45 HC is the largest optical system the company makes. • coelux.com



Cells, Reggiani • Designed by Speirs + Major principal Mark Major and senior designer Benz Roos, Cells is a bulkhead LED luminaire meant for interior and exterior urban applications. "The idea," Major said during the Frankfurt press introduction, "was to create a better quality light at a more affordable price." Extensive research led to an optic that is inspired by the cellular eye structure of a dragonfly. To that end, the fixture comes with either a transparent or an opal diffuser. The backplate is available in multiple colors; the housing in white, graphite, raw aluminum, or gray. The luminaire can be either surface or recessed mounted as a single module or in multiples via a connector accessory. The luminaire is available in 3000K and 4000K and has a lumen package of 2,150 to 2,300. Control options include on/off, DALI, dimming 1V to 10V, phase-cut, or Bluetooth. IP66-rated and shock resistant, the fixture is also available in a three-hour emergency version. • reggianiusa.com



Shown: 4" Series, 6" Series



Shown: Low Voltage Distribution System



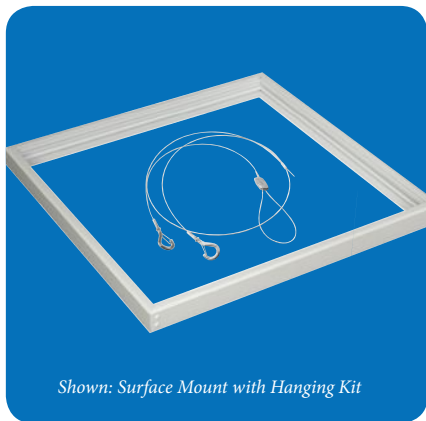
Shown: 4" to 12" Square Downlights



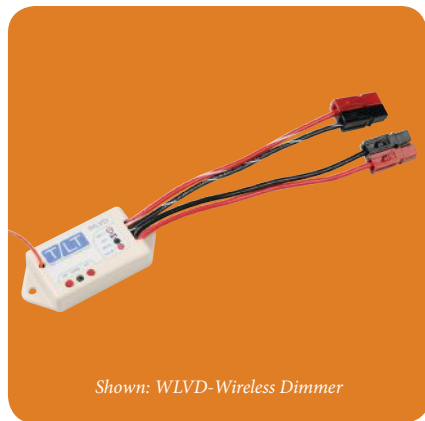
Shown: 4" to 24" Round Downlights



Shown: 1'x1' to 2'x4' Panels



Shown: Surface Mount with Hanging Kit



Shown: WLVD-Wireless Dimmer



*Shown: Wireless Ceiling Occupancy Sensor
Wireless Wall Occupancy Sensor*

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Track + Spots , Lucifer Lighting • One of the few U.S. companies who has continually exhibited in Frankfurt, Lucifer Lighting introduced several products, one of which is their new Track + Spots line of luminaires. The stem adapter has been integrated alongside the Spot fixture to create an easy connection between the fixture and track. Spot, just like the company's popular Cylinder series, features an integrated driver. Installation options for both the track profiles and the spot fixture head are available in recessed or surface-mounted versions. The luminaire has a self-locking tilt mechanism that allows for 361-degree rotation, and also features field-changeable optics in 13-, 25-, 40-, and 60-degree beam spreads. Finish options are either metal black or matte white powdercoat. Available October 2016. • luciferlighting.com



Extimity, Technilum • Designed in collaboration with French lighting designer Roger Narboni, Extimity is a modular system that addresses current urban design trends and incorporates street furniture elements with smart lighting functionality to foster the creation of a nocturnal urban environment. Using adaptable technical modules to create "light spaces," the core vertical illuminated frame measures 4 meters (13.1 feet) tall and the corner and horizontal connector pieces, which can also be illuminated, can be custom sized. Square light panels can be suspended between cable to form a "ceiling." The company's Smart In Site technology, which incorporates sensors and Bluetooth capabilities allows services to be incorporated, such as Wi-Fi, traffic info, security surveillance, occupancy sensors, advertising, and parking assistance. By combining smart features with a minimalist set of lighting elements, people can interact with the city via a seamless built and digital infrastructure. • technilum.com



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Lighting: Chris Werner Design
Interior: The Scenic Route

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Massimiliano Guzzini (with microphone) welcomes visitors to the Light Experience (left). iGuzzini's 2016 Light+Building stand (above).

LIGHT EXPERIENCE

Italian lighting company iGuzzini has redefined how it presents its products with the Light Experience, a 15-minute presentation, offered in six languages, where designers can see first-hand the dynamic functionality of the company's luminaires. AL spoke with vice president Massimiliano Guzzini at Light+Building to learn more about this unique format.

How did the concept for the Light Experience come about?

We developed this about six years ago and have now used it for the last three editions of Light+Building. We wanted to find a way to communicate our company values and how that is expressed through the technical features, innovations, and capabilities of our luminaires.

How does this year's stand design, which features Piero della Francesca's painting *Ideal City*, tie in?

It's always been important for us, as a company, to showcase innovation, design, and culture. Light is an important tool that goes beyond architecture; it impacts society and culture. The idea of the city and the skyscraper were born in Italy. We wanted to present an artistic element that is Italian but also belongs to all of society. Every age has been trying to figure out the form of the ideal city in which we want to live. The topic, and the painting, are as relevant today as it was when it was painted in the 1470s.

What's the takeaway that you want visitors to have after seeing the stand and the Light Experience?

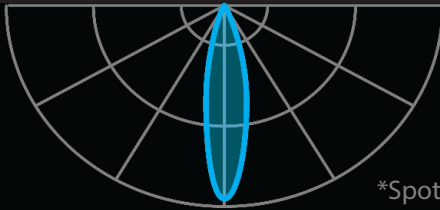
We have created an ecosystem for people to come and see the Light Experience and the product tables so they can get ideas. We want them to be able to touch the products and visualize solutions.

Will the Light Experience be incorporated into your showrooms?

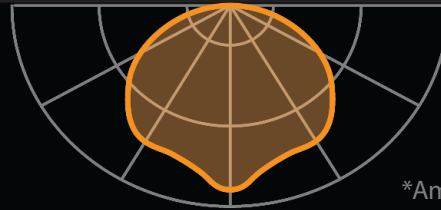
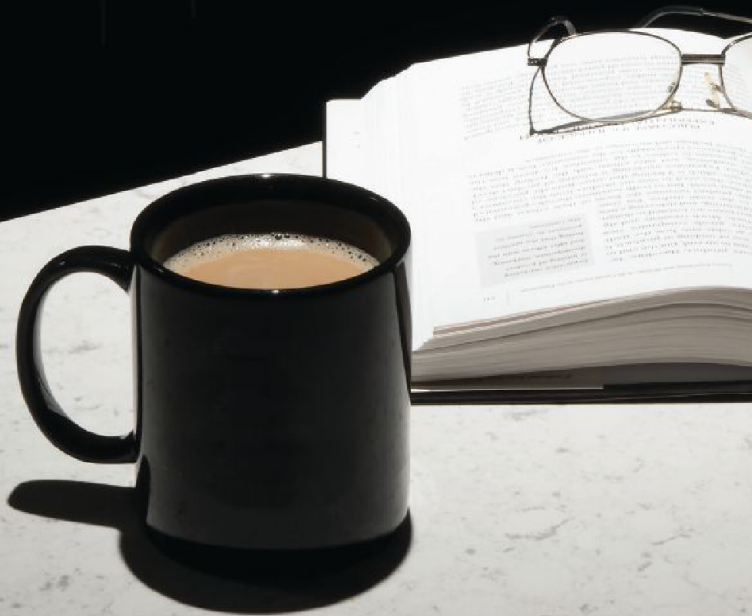
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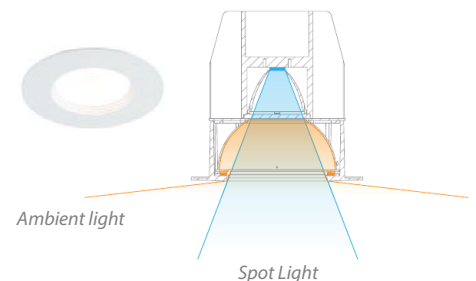
*Ambient light distribution
Lower brightness
Warm white light

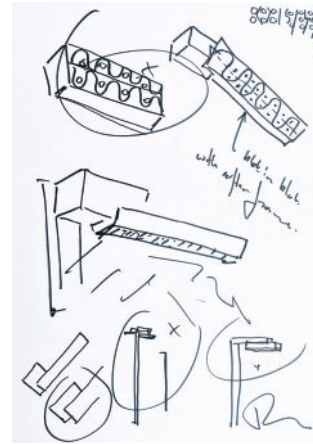


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NOCTURNAL LIGHT

A collaboration between Zumtobel and architect Ben van Berkel and his team at UNStudio, NightSight is a new modular outdoor lighting system designed to address the nighttime urban environment. AL spoke with van Berkel at Light+Building to learn more about the collaboration and the development of the luminaire.

NightSight, Zumtobel • Available as a projector-style luminaire for façade lighting and as an area luminaire (shown), the light heads of the individual LED modules can be adjusted to any angle. Available in 3000K and 4000K, installation options include mast, wall, floor, or ceiling. • zumbobel.com

How did this collaboration come about?

We've worked with Zumtobel for many years and done interactive façade lighting projects such as the Galleria Department store in Seoul, South Korea.

How did the concept for NightSight originate?

Light is today's information. It's digital. It's going beyond the classical way of how we have thought about light. That's why I was so fascinated in thinking about what light can do in a space and how you could introduce an interactive quality that could activate social gatherings.

Are there projects you are working on where you will use the fixture?

Yes, we're working on all the metro projects in Qatar. There are 33 stations. They've asked me to think about the relationship between the stations and the city, and how they can become orientation points.

How did you decide on the name NightSight?

We like the idea that it is not an individual product and object having autonomous quality. NightSight is dealing with a more global landscape that goes beyond the product itself. •

Left: Inga Powilleit; Top, Right and Bottom, Right: Courtesy Zumtobel

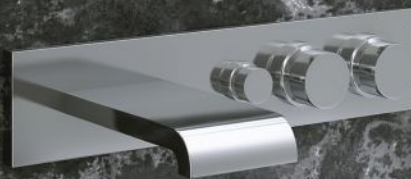
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URBAN GEM

Cline Bettridge Bernstein's lighting design for a landmarked New York City building anchors it on Union Square and transforms it into a reference point for the area.

SQUARE SAVINGS BANK

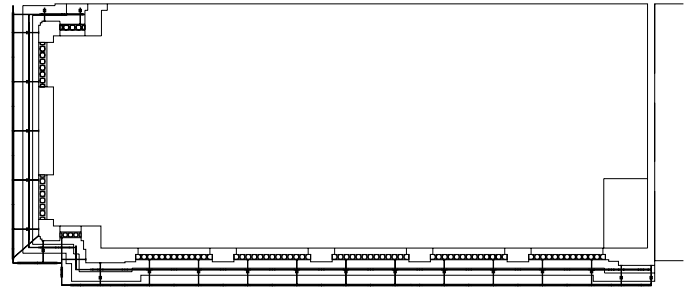


The Daryl Roth Theatre sits on a narrow site at the corner of East 15th Street and Union Square East, across from Union Square in New York City. With its new façade lighting, the theater serves as an anchor for the surrounding area.





ROOF LIGHTING PLAN



text by Elizabeth Donoff
photos by David Sundberg/ESTO

It's not easy being a lighting designer today. Just ask Francesca Bettridge, principal of New York-based firm Cline Bettridge Bernstein Lighting Design (CBBLD), to tell you the story of how the façade illumination for the Daryl Roth Theatre came to be. Like a cat with nine lives, the project, which took more than five years to complete (finished in August 2015), encountered every possible natural and manmade challenge you can think of. Any one of those obstacles—from change of manufacturing partner, to technology evolutions, to catastrophic weather events (Hurricane Sandy, to be exact), to exhaustion of fees, and all that on top of installation and other technical difficulties—would have been reason enough for the project to falter. The fact that it was completed with its intended custom lighting solution is a testament to Bettridge and her team's tenacity and perseverance. It was a true labor of love, she says, and one that she might not have been able to tackle earlier in her career. Thirty-plus years' experience gave her the hindsight to know how and when to negotiate with the client and the manufacturer so that the integrity of the lighting design was fully realized.

The project began when Bettridge was approached by Steven Roth on behalf of his wife, the Tony Award winning theater producer, Daryl Roth, to illuminate the off-Broadway theater that bears her name and is housed in the former Union Square Savings Bank building (originally designed by architect Henry Bacon in 1907) at the corner of East 15th Street and Union Square East overlooking Union Square Park in New York City. The theater acquired the building in 1996, and, while it had undergone a few renovations to create the three performance venues inside, the exterior lighting had never been addressed. In fact, the building exterior

had never been illuminated at all. Initially, the client only wanted to light the classical-style architectural details, but an early mock-up in July 2011 showed them that it would not achieve the desired effect. As a result, the client decided to light the entire exterior and to have a scheme befitting a theater, one that would welcome theater-goers on performance days. At the same time, the owners wanted the building to serve as a nocturnal anchor in the urban hodgepodge of the neighborhood where commercial, residential, transportation (the Union Square subway station serves three major lines), and green space meet in very close proximity.

To start, Bettridge and her team, Michael Hennes and Jeff Hoenic, made a historical survey, examining the ways in which building façades have traditionally been illuminated. The evolution of façade lighting closely corresponds to the evolution of source technology, as architects have sought to highlight buildings since the early 19th-century monuments and skyscrapers. Early lit buildings outlined the forms using incandescent lamps, and then floodlighting from a building base using high wattage incandescent, and later HID sources, became a common strategy. As zoning guidelines evolved and called for building setbacks, designers began to use parapet locations to position fixtures and highlight building crowns. With the advent of luminous ceilings, common in modernist architecture, exterior lighting drew on the interior and used it to project an outward glow—the Seagram Building in New York being one such example.

Armed with this information, CBBLD embarked on a trio of detailed studies to assess location options and associated costs. But first the firm had to create the base documentation.

Research had unearthed only one drawing of the landmarked structure. Using that, plus photos and site measurements, the team constructed the CAD documentation needed for rendering and light modeling that they would need for their presentations to the client and the New York City Landmarks Preservation Commission (LPC).

In their first two studies, the team explored the use of metal halide floodlights mounted on poles across 15th Street and Union Square East, as well as floodlights mounted on the building terrace across 15th Street. Both options lit the building from angles that flattened it. A third study looked at attaching the fixtures directly to the building. Dimmable LED linear wallgrazers would be mounted to the theater's cornice but none existed that could light the entire façade evenly. The AGI renderings confirmed that this solution not only provided the right amount of illumination, but it put the light where the designers wanted it, achieving enough contrast across the façade while highlighting the architectural details. It also provided minimal light at the sidewalk without any spill light to the surrounding buildings or park.

With the client on board, it was time to get approval from the LPC. Because of the landmarked status, the team had to show that the new lighting scheme could be implemented without changing the existing building or having a visual impact on the architecture. Further adding to the complexity was the fact that there was no architect of record or general contractor on the project. Everything fell to CBBLD to coordinate and present. Bettridge notes that today, lighting designers are faced with a lot of new circumstances to deal with, and often that means the absence of a traditional project team.

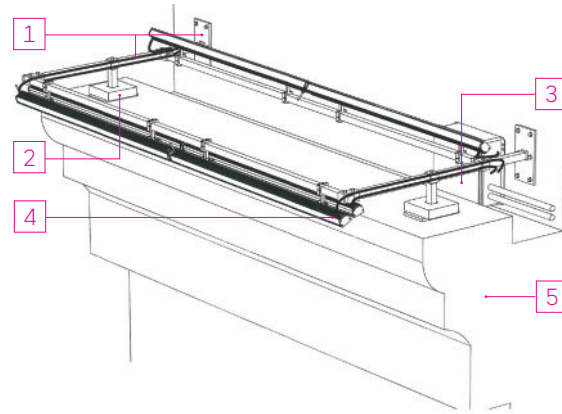
At this point, CBBLD began working with a major manufacturer to develop the fixture and obtain pricing. CBBLD recommended to the client to proceed with a full-scale on-site prototype mock-up, which they approved. This took place in December 2012 and was invaluable. It not only confirmed the solidity of the design, but it enabled the LPC approval process to go smoothly. With a project price in hand and the client's permission to proceed, CBBLD was ready to move forward—which is when disaster struck. "Literally the next day, I got the call from the manufacturer that their head office had shut down the special projects department and were abandoning the work with us," Bettridge explains. She reached out to the company to see if there was any way they might still proceed. No luck. The local rep agency did what they could do to assist with finding another manufacturing

partner, but the bulk of the responsibility fell to CBBLD, along with the duty of explaining what happened to the client.

In the end, CBBLD did find another manufacturer to do the job, but it was not without a new set of complications. In the ensuing time, Hurricane Sandy had hit the East Coast, and the New York City Department of Buildings had changed its guidelines regarding bracing structures. Concerned about uplift, the fixture mounting arms now had to be re-engineered to add weight; this required changing the supports to solid-stock steel rather than hollow-tube steel. Once the fixtures were installed, CBBLD noticed they were backward, and later a series of bright spots on the façade. The fixtures had not been fabricated to the waterproofing specifications, requiring them to be re-made and re-installed. The manufacturer stood by the product and made all of the necessary corrections.

Despite the extreme challenges, the custom luminaire and how it accomplishes the lighting design is remarkable. The perseverance of the lighting design team illustrates what it means to be at the leading edge of lighting design and having the technical prowess that separates the seasoned designer from the novice. This project reveals the complexity of design practice today and what it takes to innovate. •

MOUNTING SYSTEM DETAIL FOR DOUBLE GRAZER/BALUSTRADE FIXTURES



- | | |
|--|---------------------------|
| 1 Mounting brackets and armature | 4 Double grazer luminaire |
| 2 Support footings | 5 Cornice |
| 3 UL-listed power supply for every 10' run | |

A custom mounting bracket system supports the custom-designed grazing luminaires, which feature two fixture heads, one with a 9-degree beam spread to illuminate the upper cornice and one with a 34-degree beam spread to wash the lower portion of the façade (right).

Details

Project: Daryl Roth Theatre Façade, New York • **Client:** Daryl Roth Productions, New York • **Lighting Designer:** Clíne Bettridge Bernstein Lighting Design, New York • **Consultant for Landmarks Process:** Rosen Johnson Architects, New York • **Project Size:** 17,482 square feet (façade) • **Project and Lighting Costs:** Withheld • **Code Compliance:** ASHRAE 90.1-2007 (Not exempted because it is a New York City landmark, not a state or national landmark) • **Watts per Square Foot:** Not applicable due to mix of tradable and non-tradable space types. Total wattage is 4,135W, which meets 0.2 watts per square foot category requirements for a building façade under ASHRAE 90.1-2007

Lighting Manufacturers

Acolyte LED: All fixtures are dimmable and use 3000K warm-white high output LEDs. Fixture colors and mounting armature selected to blend with building stone and window metalwork. The five fixture types and locations are: Double grazer fixtures cantilevered from the cornice; arm-mounted balustrade uplight, hidden from view from the cornice; windowsill uplight with integral glare shield on 15th Street façade; portico ceiling uplight with integral glare shield, mounted to the top of the window lintel; and arm-mounted double grazer, concealed behind the portico entablature, which washes the back wall.





Gabriel Dawe's installation *Plexus A1* (2015) uses colored thread and looks like rays of light.

RENWICK RENAISSANCE

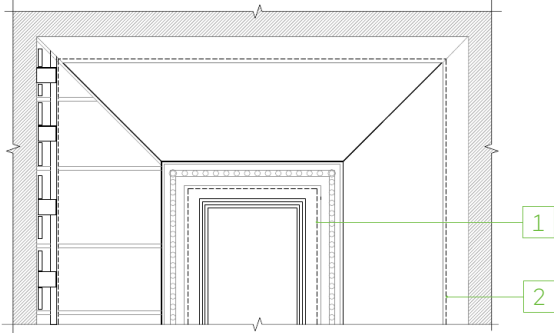
*A comprehensive renovation, more than two years in the making,
sets a new benchmark for museum gallery lighting.*



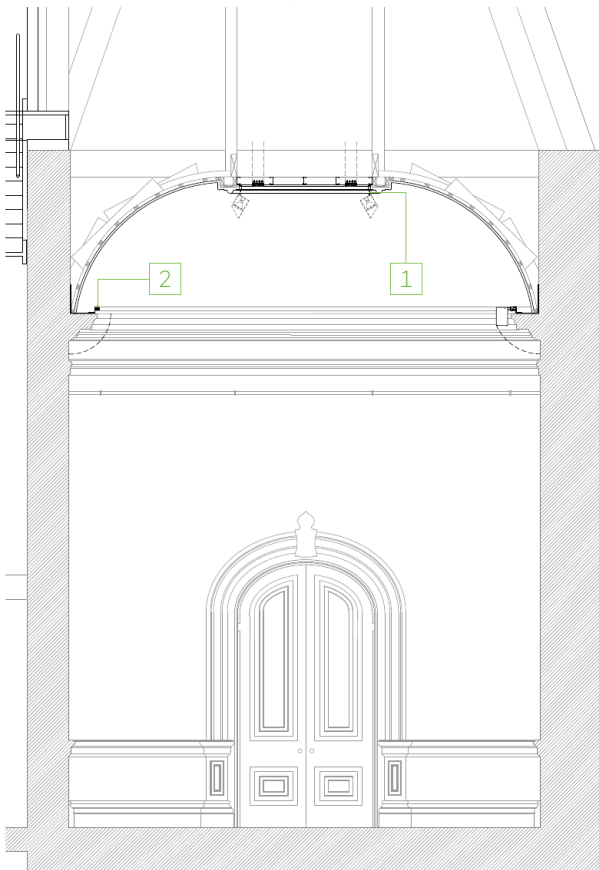
Maya Lin's installation *Folding the Chesapeake* (2015) uses glass marbles spread across the walls and floor of a second-floor gallery to map the Chesapeake.

© Judy Davis/HDPhoto

COVE REFLECTED CEILING PLAN



COVE SECTION



- 1 Continuous lighting track installed flush with interior edge of molding
- 2 Continuous lighting track mounted to 3" perforated steel channel

text by Elizabeth Donoff

The \$30 million renovation of the Renwick Gallery of the Smithsonian American Art Museum, which began in July 2012 and was completed this past November, represents a multidisciplinary effort that touched on every part of the building and its systems in a comprehensive effort to modernize the museum with state-of-the-art and energy-efficient technologies. The galleries and public spaces use all LED lighting and the back-of-house spaces use higher-efficiency fluorescent sources with daylight and occupancy controls. Originally built in 1859 by architect James Renwick Jr., the building is a National Historic Landmark and had not been renovated since the 1970s.

One of the key areas of focus was the lighting. A detailed investigation into finding the right luminaires led to an intensive study and analysis on the part of architect and lighting designer Tom Gallagher from Westlake Reed Leskosky, the principal firm overseeing the project, and the Smithsonian's resident lighting designer Scott Rosenfeld. Their collaboration reflects a new level of investigation that designers need to incorporate into their work to meet project needs and to keep up with the constant and rapid rate of change in LED technology. The research necessary for this project resulted in the design of a custom system and specific lamp and luminaire selections to create a 21st-century LED lighting solution for museum applications.

Well before the Renwick renovation got underway, Rosenfeld had already been testing new LED lamps at the Smithsonian as part of the U.S. Department of Energy's Gateway demonstration projects. In 2012, he had experimented with the market-available LED PAR30, PAR38, and MR16 lamps in a few of the Smithsonian's American Art Museum galleries



to replace existing halogen and incandescent sources. While some of the LED replacement lamps were acceptable and worked with the museum's existing track system, one of the main issues that had to be resolved was color shift. Still, these early tests gave Rosenfeld the confidence that, as LED lamp technology continued to improve, the new technology could be used in museums to meet curatorial needs without compromising either the art or the visitor experience. And this was on top of the obvious significant energy savings.

As the renovation of the Renwick commenced, the Smithsonian wanted to use all LEDs but the project team wasn't sure the budget would support that. "This is where the integrated design model really paid dividends," Gallagher says. Also, because the mechanical equipment had to be kept under the roof line in the attic space because of the building's landmark status, an LED lighting system would not put as high of a demand on the overall building's energy loads as a traditional halogen system would have. This correlated to both a

lighting savings and overall operating savings for the renovated building.

Also significant was the development of the tracklighting system for the galleries. Using Rosenfeld's research into LED retrofit technologies as a baseline, the designers "pursued the development of a set of fixtures that utilized LED retrofit lamps with the benefit being that we have much more beam control," Gallagher says. This allowed the designers to have a lamp and fixture that could produce very narrow beam spreads—4, 6, 10, and 15 degrees. By going with LED retrofit lamps instead of a fixture that had an integral LED light engine was a significant and critical decision, because integral LED modules can only offer wide beam spreads—such as 20, 40, or 60 degrees. "An internal reflector defines the beam spread," Rosenfeld says. But the lighting designers were looking for a fixture that could provide a really tight narrow spot to meet the needs of the curators. And this part was particularly important for the Renwick, which often has small objects on display.

Working with Solais, the team developed a 4-degree very narrow spot—one that came with a decent warranty. "It's not easy to get a manufacturer to offer a lengthy warranty," Rosenfeld says, but "for the lamp we designed for the galleries, we were able to get the manufacturer to honor a 6,000-hour lamp."

Another crucial aspect of the lamp and luminaire development meant that the housing had to be modified—both elongated and made wider to accommodate the LED retrofit lamp. The housing is 8.25 inches long and 5.75 inches in diameter. The changes in size also accommodated a passive cooling system which allows air to circulate and cool the lamp.

Gallagher and Rosenfeld's ability to keep an open mind throughout the process and to adapt to solid-state lighting advances that occurred during the course of the multi-year project served them well. All the wallwashing and object lighting is done via the track fixtures and able to work in the galleries that have extremely tall ceiling heights: 26 feet. "The magic of the solution at the Renwick," Gallagher

Top and right: Ron Blunt

says “is that we have an LED lamp with low power consumption but also the full range of beam spreads that lighting designers enjoy with halogen lamps.”

And it’s not just the electric lighting in which the collaborative effort between the architect and lighting designer excelled. The windows in the building were replaced with insulated glazing, and an inner layer was introduced that eliminated more than 99 percent of the ultraviolet light within the glazing composition, which in turn eliminates ultraviolet light coming into the galleries. This means visitors are still allowed a connection to the outside while in the galleries, rather than having to create a fully dark black box gallery.

The design team also settled on 3000K for

the lamp color temperature. Normally, 4000K is used, but because a majority of the galleries have windows, Rosenfeld raised an important issue: Should they match the electric light to the daylight? Or still, why not filter the daylight to match the electric light? For one thing, there isn’t necessarily one right color temperature and for another, daylight fluctuates. “So long as you can mentally understand and see where the different sources are coming from, it’s not strange to have a slightly different color temperature between daylight and electric light,” Gallagher says.

The intense commitment to collaboration between team members and manufacturing partners has amounted to a state-of-the-art lighting solution that sets a new standard for museum applications. •

Details

Project: The Renwick Gallery of the Smithsonian American Art Museum Major Renovation, Washington, D.C. • **Client/Owner:** Smithsonian Institution, Washington, D.C. • **Architect, Engineer, and Lighting Designer:** Westlake Reed Leskosky, New York • **Additional Consultants/Lighting Designer:** Scott Rosenfeld, Smithsonian Institution • **General Contractor:** Consigli Construction, Washington, D.C. • **Structural Engineer:** Wood Peacock, Alexandria, Va. • **Civil Engineer:** Wiles Mensch, Reston, Va. • **Project Size:** 34,000 square feet (net); 46,598 square feet (gross) • **Project Cost:** \$30 million • **Lighting Cost:** \$605,493 without gallery lighting (not part of construction contract) • **Code Compliance:** International Energy Conservation Code 2012

Lighting Manufacturers

Acuity Brands/Lithonia: Emergency lighting • **Columbia Lighting:** Direct/indirect industrial fluorescent luminaire for back-of-house stair areas • **California Accent Lighting:** Exterior walkway lighting • **Litecontrol:** Fluorescent coverlights at rest rooms • **Litelab:** Track-mounted PAR38 cylindrical fixtures outfitted for multiple functions—wallwash and object light, as well as to hold various lenses, filters, and accessories—depending on gallery needs for installations and artworks; track-mounted object lights with integral driver; track-mounted MR16 object fixture with spill shield and snoot • **Eutrac:** Surface-mounted two-circuit track for galleries • **Kim Lighting:** LED bollards on roof • **Metalux:** Direct/indirect fluorescent luminaire with wire guard for mechanical and electrical rooms • **Philips Selecon:** Track-mounted beam shaper projector with Eutrac connector in galleries • **Selux:** Linear fluorescent fixture in basement areas • **Solais:** Very narrow spot lamp with a 4-degree beam for use with gallery tracklighting • **SPJ Lighting:** Exterior steplight • **Zumtobel:** Compact fluorescent downlights for offices



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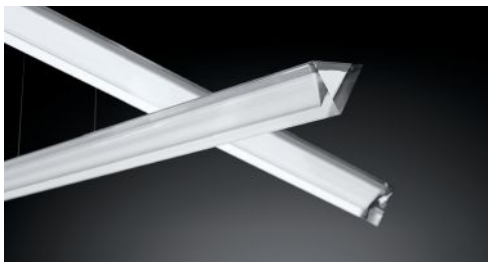
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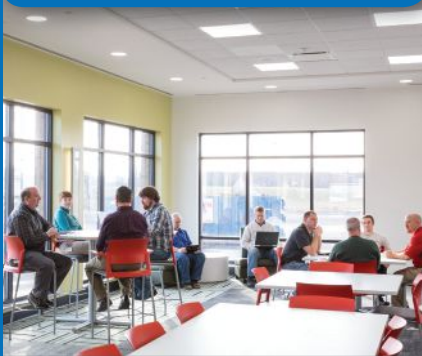


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“It’s an exciting time to be in lighting because of new technology, and because over the past hundred years there’s been a lot of human knowledge developed about how to light spaces.”

EMMA PRICE

She has one of the most famous last names in lighting—Price. When you meet Emma Price, however, what strikes you is her humility, especially when she speaks about her father, the late lighting great Edison Price (1918–97). There was never any pressure for her to join the family business, New York-based Edison Price Lighting; that came about naturally. An economics major in college, in 1989 she became company president, and has used her business acumen to run the enterprise that her father started in 1952. Fixture integrity and lighting quality have been company hallmarks no matter the latest technology. Commitment to personnel has been a signature of the company as well, as many who have worked for Edison, such as executive vice presidents Rick Shaver and Joel Siegel, have stayed while Emma charts its future growth.

What fascinates you about light?

It’s a combination of art and science, logic and emotion. You’re creating atmosphere.

Do you have a lighting philosophy?

My father always thought lighting fixtures should be unobtrusive, and we’ve continued that. It’s important to have simplicity in a fixture.

What makes a great luminaire?

Control of light. Also, there has to be room for customization. When you are designing a luminaire, you really need to think about options.

What represents “innovation” in lighting?

I’m not an innovator or inventor the way my father was. Innovation has to come from creative people; I hire people with a creative lighting bent.

What traditions are important for the company to maintain?

Integrity. It’s important that our customers know that we’re honest, that we do what we say we’ll do, that we don’t cheapen our fixtures.

Where do you see the industry heading?

Things will continue to become less expensive, while the technology will get better and better.

What would your father have thought about LEDs?

He loved music and preferred LPs to CDs because he thought they had a richer sound. He would have thought the same about lighting: It’s whether the light is more satisfying to the human soul than previous lighting. He would have cared about the quality of light. •

interview by Elizabeth Donoff
photo by Fran Parente

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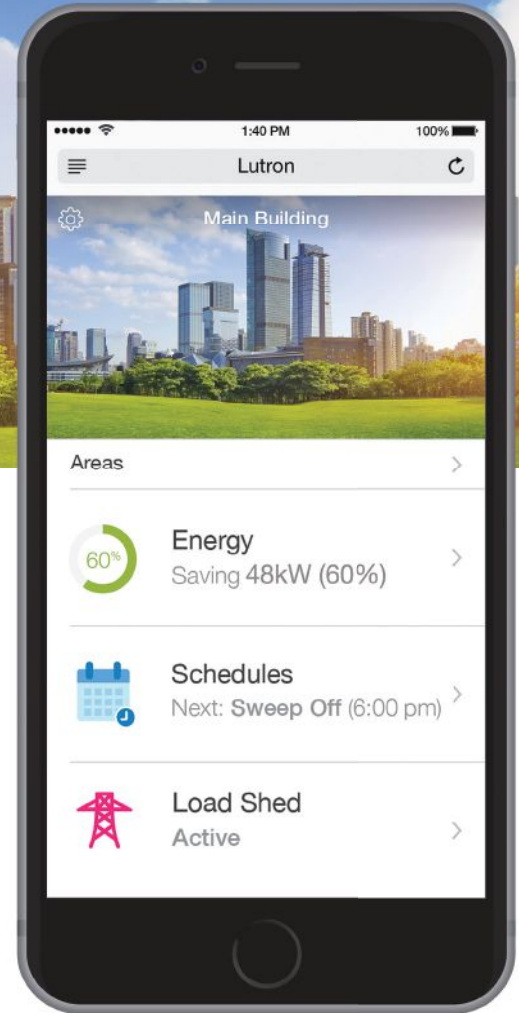
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