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Commercial smart lighting and the Internet of Things revolution

BY PENNY JONES

Let's not beat around the bush. The pace of technological change is bewildering (sometimes even enough to make you want to bury your head under the doona). But being a luddite is simply not an option for lighting professionals – the smart revolution is here and if you don't keep up, you'll get left behind.

Hot on the heels of the LED uprising, the Internet of Things (IoT) is already changing the way we live as it automates tasks and bridges the gap between our physical and digital worlds. Companies see the tidal wave coming and are increasingly curious about how smart technologies will impact and enhance their operations.

Bryan Douglas is Secretary General of the Global Lighting Association (GLA), the voice of the lighting industry on a global basis. Earlier this year GLA published its Strategic Roadmap of the Global Lighting Industry, which presents a vision of the role of lighting to the year 2040. He says smart lighting is central to this vision.

"The digitalisation of lighting has enabled the development of intelligent lighting systems, and there are opportunities here for lighting to form the core of the physical internet," he says.

Douglas explains that the centrality of lighting in this model has given rise to the concept of the *Internet of Light*, or Li-Fi, whereby light sources, drawing on the ability of light to transmit data, complement – or even replace – Wi-Fi.

"An Internet of Light is created when smart lights are connected by digital networks and can communicate with each other, with a server or gateway, and with sensors and controls. In this way, we might soon see the Internet of Light becoming the backbone of a building-management or home-automation network," Douglas continues.

The advantage of an Internet of Light – and a key driver – is the ubiquity of lights and the fact they already have a power source which can be used to run other components and devices integrated into, or attached to, the networked lights. Other advantages include the fact that light has a bandwidth 1,000 times greater than radio, it offers improved security and can also be applied in settings that are difficult or impossible for Wi-Fi, for example, aircraft and high-security installations like petrochemical plants.
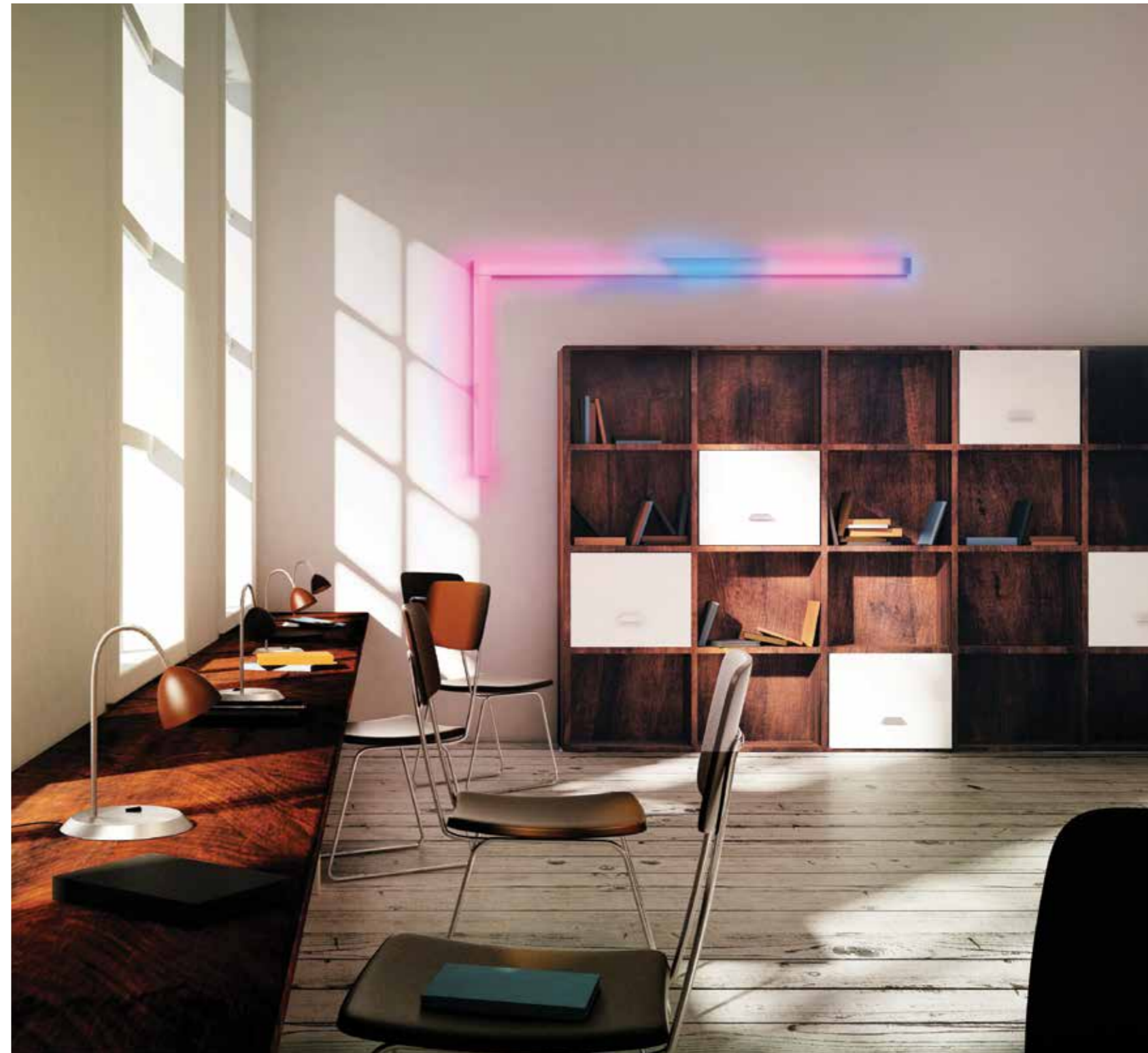
The LIFX A19 smart light fills an entire room with vivid colour or the perfect shade of white in an instant.
Image supplied by LIFX www.lifx.com.au

"Interestingly, next generation 5G wireless network protocols are slated for introduction by 2021, and it has been suggested that light will be the main data carrier," continues Douglas.

Beatrice Witzgall, CEO and founder of New York-based smart lighting wireless IoT platform, LumiFi, says she quickly saw the potential of smart lighting and established LumiFi to fill the emerging gap. Since creating the company in 2014 she says smart lighting opportunities have grown exponentially, but confusion in the industry is muddying the waters and restricting uptake.

"Smart lighting is a game-changer in the industry. It's comparable to the shift from analogue to digital photography – because the technologies are so inherently different, smart lighting will bring about new functionalities that we can't even imagine at this point," she says.

According to Witzgall, installing smart lighting in a new build or office refit, for example, offers benefits in terms of flexibility and control for occupants and management, but significant cost-savings too.

"Because you don't need wiring, heavy hardware or expert programmers, there are incredible savings to be had, although they can be hard to quantify as the budget numbers come from different buckets," she continues.

"In the US, the lighting industry is based on margin stacking of hardware resales, on average across four partners, whereas the new technology is a direct software sale. This means smart lighting takes a lot of money out of the pockets of the key players in the industry, so they are not really endorsing it."

Witzgall says the switch to smart lighting is inevitable, but, in addition to the lack of endorsement from key players, the complexity of the specification process also hinders progress.

"This is one of the biggest hurdles for adoption. Currently, control systems are an additional layer treated more as an afterthought and that needs to change because it's an integrated technology where the communication chip is part of the light fixture. Specifiers need to be explicit about having a wireless system and should take the responsibility of specifying it," says Witzgall.

"In addition, manufacturers need to be clearer about the value proposition and what they enable with wireless control. I haven't seen a good example of a manufacturer incorporating wireless controls properly in the specification sheet yet. It's often treated as one of many driver options at the bottom of the spec sheet and easy for people to overlook."

The problem, continues Witzgall, is that because all the benefits are on the client side, no one in industry is driving the change. "Typically, strong clients or a forward-thinking lighting designer are the ones pushing for it, but even then, we've had clients who were excited about the technology, but when they asked their team were told, 'Oh, it's a new technology, it's not really working yet, don't go for it…'" which is a very unfair statement."

Witzgall says the factors that would accelerate the uptake of smart lighting include clearer roles and responsibilities, better specifications and increased application. There also needs to be better documentation by the manufacturers about the integration of wireless technology.

The LIFX Z is a lighting strip that uses Wi-Fi to create the perfect light.
Image supplied by LIFX
www.lifx.com.au

The LIFX Beam can transform the way a space looks and feels.
Image supplied by LIFX
www.lifx.com.au

LEFT: A New York City hotel room in four different 'lightmospheres' – controlled by LumiFi www.LumiFi.com.
Photo credit: Jovan Carlton

"I also think we need to educate people to think of the possibilities. There's such a wide acceptance of 'set-and-forget' controls whereas with smart technology, lighting is dynamic, changing, personal, flexible, intelligent. We need to challenge the old mentality that lighting is static," she says.

To realise the full potential of smart lighting and the IoT, Douglas says there needs to be more collaboration between lighting and IT companies. "In a world where enabling vision is only one aspect of lighting, collaboration is essential for the very survival of lighting manufacturers," he warns.

"Failing to enter these relationships risks relegating lighting companies to bit players – or worse, to oblivion – where the world's major IT companies predominate."

One trend gathering momentum, particularly in offices, is a focus on occupant health and wellbeing, and increasing numbers of Australian buildings are seeking accreditation by the international WELL Building Standard. The Standard measures a building's impact on peoples' wellness, with one of the criteria being access to Human Centric Lighting (HCL).

Douglas says HCL revolves around the growing body of research that considers how light impacts cognitive performance. "We do not yet have a perfect understanding of what 'light recipes' are needed in every situation, but it is widely acknowledged that HCL offers a vital tool to improve alertness, cognitive performance and the sleep/wake cycle, as well as to influence mood, to energise and to promote relaxation," Douglas says.

He cites the example of Prague energy company Innogy which has recently completed one of the largest HCL projects in Europe. Innogy installed over 2,000 light fittings that provide dynamic illumination for 550 workers across 10,000 square metres. The LED luminaires are tuned to the workers' sleep-wake cycles and are designed to stimulate energy levels, although employees may at any time override the light settings, tailoring the light to suit their needs.

Marc Alexander is the co-founder and Chief Product and Technology Officer at LIFX, which is a line of energy-efficient, multi-colour, Wi-Fi enabled LED light bulbs that can be controlled via a device such as a smartphone. The company was established in 2012, with a Kickstarter crowdfunding campaign that was out-of-the-ballpark successful. Today LIFX is only outperformed (on sales and other performance metrics), by Signify in the smart lighting space globally.

"Our product was the first smart wireless lightbulb on the market to use Wi-Fi to work directly with your smartphone. You just screw it in, download the app and use your device to transform the way a space feels," he says.

Alexander says LIFX is one of only a few companies that supports all voice platforms. He says the journey towards voice control lighting has been fascinating because LIFX develops so well with partners, including Amazon, Apple and Google.

"Where do I start with voice! There is still a lot of scepticism about voice control, but it only takes a 30 second positive voice experience to turn a sceptic around. I know this to be true because this is exactly what happened with many friends, family and my own personal experience," he says. "The uptake on voice at LIFX has been tremendous and is now almost a half-share of our light usage triggers."

It's still not common, except perhaps in Silicon Valley, for commercial enterprises to be embracing voice, but Alexander has seen it integrated into the hospitality industry, commercial and residential developments. "We've been across some large hotel refurbishments, where voice is becoming an important part of the experience," he says.

The elephant in the room of all this whizz-banging, cutting-edge technology is, of course, cybersecurity. The more connected everything is, the larger the threat of some nefarious person or group coming along and with the push of a button disrupting it all.

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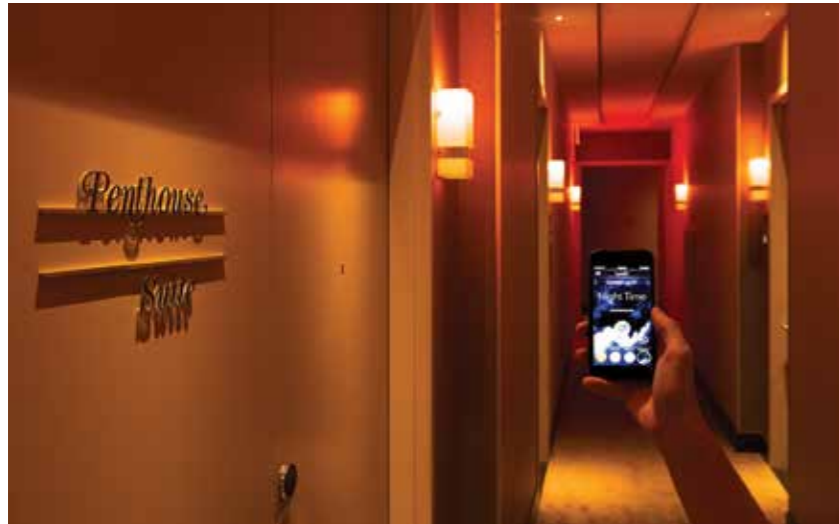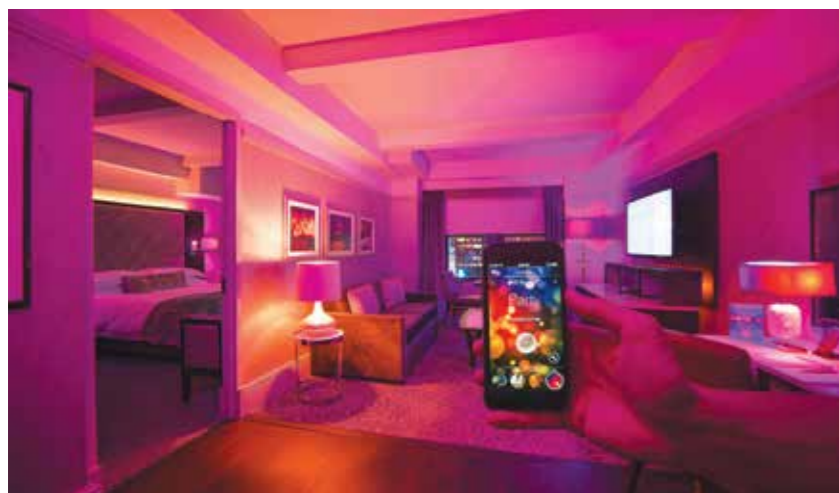
Night-time mode in a penthouse suite corridor in a New York City hotel – controlled by LumiFi www.LumiFi.com
Photos by: Jovan Carlton
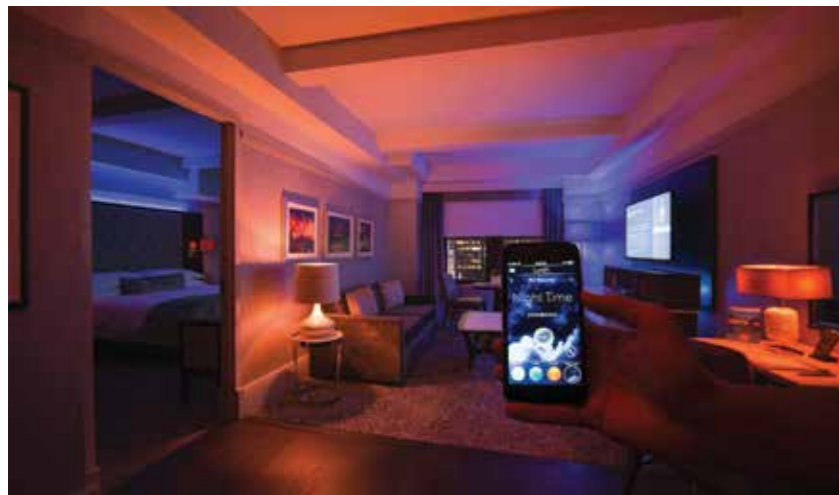
Night-time mode in a New York City hotel room – controlled by LumiFi www.LumiFi.com

Event mode in a New York City hotel room – controlled by LumiFi www.LumiFi.com

Alexander is not exactly blasé about the issue of cybersecurity, but he is less concerned than you might think. In terms of voice, at least at the moment, he says the virtual assistants run 'tight and secure programs' that only activate when they hear the right trigger word (i.e. Hey Google, Alexa or Hey Siri).

"If you look at the technology behind it, and contrary to what many people think, these devices are not listening to you all the time and sending what you say anywhere. I'm not saying there aren't hands-on exploits where the electronics in anybody's home could be modified by someone of criminal intent, but outside of the crazy edge case, they are quite safe in their operation," he says.

"It's not obvious to the marketplace, but all of the best IoT products have strict internal security audits that are getting continually reviewed with firmware and software updates being rolled out securely and automatically to these products. Security is definitely being taken seriously."

While product developers have obvious cybersecurity responsibilities, Witzgall says there is also a role for government and says the data protection model in Europe is a good example of how to successfully protect people's privacy.

"Having said that, I don't think systems will ever be fully secure," she continues. "A smart hacker will find a way to commit fraud, it happens every day, and you still accept it. Everything with security is a game: you implement a system, a hacker finds a backdoor, you close it, and the whole game starts again. Security is an important topic, but people use it as an excuse to not implement a smart system or give the technology a try, and I think that is a mistake."

All the experts agree that this is a fast-changing field that is hugely exciting to be a part of. "Smart lighting will open up a whole world of innovation," says Witzgall. "Once people embrace it." ◨

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