Notes from conversation with
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Introduction

Florence Lam is the Global Lighting Design Director for Arup and winner of many accolades and awards, including the SLL president's award 2020..

This is the first in the Luna Pro campaign to build the business case for investing in good quality lighting. This project is supported by a global team of leading manufacturers: Bios, Glamox Luxonic, Phos, Signify, Seoul Semiconductor, Signify and Zumtobel.

In this conversation with 'live' audience (via Zoom), Florence shares her vision for a new approach. A summary is below.

'Humanity-centred lighting'

This is a call for a new approach to sustainable development: how can we confront climate change and reshape a better world?

What do I mean by better?

A world where each one of us has safe, healthy access to amenity and environment and live in inspirational surroundings that are affordable as well as sustainable.

Lighting is not just about people in society, but the planet as well. Switching from human- to humanity-centred design means holistically embracing the UN Sustainable Development Goals to create a better world.

The pursuit of sustainable development is a balancing act between people and planet to shape a world that is safe, inclusive, resilient, and sustainable.

And as a professional of the built environment, we play a critical role in moderating this delicate balance. Lighting can play a significant role in many of the UN SDG's from ensuring good health and wellbeing to building resilience, cities and communities while tackling climate change.

But how?

What we do as lighting designers contributes to making spaces work for people. For lighting to be truly for people and planet, we need to design beyond just mitigation.

Whether it's a public realm space, dynamic facades that communicate to the public in a meaningful way- rather than just flashing lights - our workplaces, transforming dis-used underground facilities into public spaces, or how we can create a rainforest greenhouse in an indoor environment for a scientific institution and educate the public too.

We need to harness new knowledge and take actions to enable and realise urban greening, biodiversity and a circular design approach. We need to put in the extra effort to work out what we can do better.

The depletion of carbon has been a root cause for many of the global challenges. In order to achieve the UN climate targets, it's critical for us to also transform the way we design specify, make and use products. We also need to explore what we can do to integrate the highly fragmented construction industry.

Key topic for today: What is lighting for human health?

Human health is defined not only by the physical state of individuals. It is a state of a complete physical, psychological, and social wellbeing.

I assume you are familiar with the non-visual effects of light and basic scientific knowledge of how light can affect circadian rhythms and different ways of calculating these stimuli.

So I will start with the empathetic, emotional value of light, which can impact the psychological and social wellbeing of people.

In physics, light is a wonderful scientific phenomenon with particle-wave duality, shadows, colours, etc.. But when light actually enters our eyes, magical things happen in our brain. There is a gap between knowing what light is in science and the everyday perception of physical surroundings, to how light can move you and shape your emotional framework in daily life.

It's both complex and constantly changing. Light plays a key role in our culture. Humanity has always used light as an emotive means of connecting, creating memories and experiences that are beyond human reasoning or understanding.

Light provides a context similar to that of a scene in a play or in a movie.

As lighting designers, we often refer light as a fourth dimension of architecture. It creates atmospheres, ambiances and connects people to space, emotively, influencing how we behave and experience our environment in a language that narrates different characters of light.

We have used light to characterise building structures, exterior or interior spaces which in turn creates spatial narratives and shapes our experience. Lights can guide you through the festive seasons and transform an exterior into a giant display case of jewels lit from within, contribute to after dark environments, radiate quality and a sense of place with light. It can create and curate a perfect environment for athletes to break world records, create a light art installation to transform pedal power to joy, and shape outdoor space to encourage social cohesion and interactions.

I believe fundamentally that the best light for human is daylight.

Daylight is the source of everything on earth. The quality and variability of daylight plays a huge role in shaping different cultures around the world.

A survey of employee experience cited in the Harvard Business Review in September, 2018 revealed that employees crave this one thing - it's more fundamental than bean bags or expensive desks - access to daylight and views to the outdoors.

Not only did the study find that the absence of daylight and outdoor views is detrimental to the employees' experience. Many employees actually felt more tired and gloomy in the absence of daylight.

So really daylight is the best light. And it's free.

Design for daylight is often the first step our designers would consider at an early stage of a project, working closely with architects, to explore how we can bring the best daylight into a space: sculpting facades, roof lights or skylights …not just in museums and art galleries, but in airports and sports stadia.

Nowadays, as people spend 90% of the time indoors, there is a need to ensure a building is well daylit.

But this is becoming more challenging with increasing urbanisation and the densification of cities. Many developers have the tendency to build commercial buildings with much deeper floor space.

Deepening understanding through first-hand experience

It is always important to go beyond checking a box. We often use our own 'home' projects to push boundaries and improve the design we deliver, not just to meet the minimum criteria in building standards such as WELL, but go beyond.

We know that designing for health and wellbeing and circadian is not just about compliance with WELL. It needs to be a total solution that is context dependent. We need to understand that the non visual effects of light are dependent on a number of other factorsThere's still much more exciting research to be done.

If we were to look at what is truly sustainable, the only real model is nature. We look at the natural world and what we can learn from it.

We've seen numerous daylight-mimicking colour changing solutions across the industry. Aalborg University, in collaboration with a number of lighting industry partners, has been developing and scientifically validating a Double Dynamic Lighting (DDL) concept. A concept of having cool ambient light to mimic the diffused skylight and warm task light to mimic the directional sunlight.

This is similar to the integrated daylight approach we have used in a lot of museum spaces In the past. For example at the upper level galleries at Tate Modern where the fluorescent lighting systems in the ceiling glass box we designed have chromaticity balancing controls incorporated to supplement daylight as it fades to create a diffuse ambient lighting environment.

At Arup, we've been experimenting on how to synchronise and match indoor lighting spectral distribution with daylight in real time.

Daylight-matching in real time

We prototyped the idea and designed a pilot study at our London office in 2019 to get a deeper understanding of how daylight-matching spectrally tunable lighting system could affect us - in terms of cognitive performance, alertness and mood.

The trial was led by Professor Anya Hurlbert from Newcastle University's Institute of Neuroscience, together with Alex Llena, our PhD in residence, and in collaboration with Ledmotiv, who also provided the lighting technology.

We built a spectrometer on the roof of our building to capture the real time data from daylight, both in terms of intensity and the spectral power distribution. We pushed this data into the cloud, and used this data to inform and spectrally tune the indoor lighting system in our pilot study.

We completed a questionnaire every day, and every week, to understand the broader context and track mood, attention, sleeping hours and quality of sleep etc etc. We also wore personal monitors, actigraph watches, to track body temperature, illuminance exposures, wearing them even when we were asleep.

We started with standard fluorescent lighting as a baseline. And then we replaced them with a new set of LED lighting technologies with seven channels and an engine that can match the daylight across the different spectral power distributions.

We set up two different scenarios: One have both photopic and melanopic lux as well as CCT changing across the day. The other one has photopic lux and CCT fixed but with changing melanopic lux across the day. And, the final scenario was to use the data captured from the daylight tracker to spectrally tune the lighting.

The most profound outcome for me is that if one really want to follow the daylight, there is no need to change to warmer light in the afternoon.

If we can do that, the energy saving will be much greater than with the warmer colour shifting solution due to marginally higher lumens per watt with the cooler colour temperatures.

What about the costs of the daylight tracking system?

The lighting technology itself can be very expensive. But we worked out how to use the real time data to inform the indoor lighting, rather having a full spectral matching. We could translate the real time data into CCT using a commercially-available LED chip. This allowed us to work within a more viable market rate for the fixtures.

It's about finding what's reasonable and affordable**:** What really needs to be controlled and what doesn't need to be at that level.

The business case…

10-15 years ago, we had to do a feasibility report to demonstrate the payback with LED's for every single project. We would talk about simple payback: re-lamping time, labor costs offset, etc.

But once LED's were on the letting agent's list of what a 21st century office should have, this was no longer needed. It's simply a box to check. No more feasibility studies needed. If you don't have LED lighting, you can't let out that floor space. It's that simple. You don't have to prove anything. It's not just the monetary side anymore, it's a culture change.

In terms of challenging clients, it can't beat our own at Arup..

We've recently been designing for our new office space in London. It's a new build, very deep plan in a very tightly packed plot. We needed to convince our own COO it's worth investing a bit more money in the lighting to Improve health and wellbeing of our members, particularly over the areas that we know we don't get good access to daylight.

The easiest conversation comes when you can shift the conversation to say: Daylight is good over a certain percentage of the total floor space. And there are some areas where there is just no daylight access at all.

How can one justify putting anyone there that they don't have an equitable workspace compared with others?

How can one justify space that are deemed 'unwell'?

When wellbeing comes into the conversation, it goes beyond productivity. is There is an increasing expectation how wellbeing is valued in every employee's mind. Wellbeing in every sense, not just impact by a physical work environment, but how one's feel being treated and valued How people feel they have the equitable opportunity within an organisation would impact their mental wellbeing too.

This can then lead to a very different conversation about how one can't afford to have space disparity among staff.

Blue light and circadian stimulus

Around 20 years ago, in collaboration with our operation consulting colleagues, we experimented with the 17,000 K extreme cool white fluorescent lamps, supposed to help to suppress melatonin and lift your mood and reduce the 'after lunch' dip.

At the time, our team were based in a semi-basement office space with very little daylight - a perfect environment to test the lighting system. We designed simple lighting trunking system with separate uplighting and down lighting components. We alternated 17,000 K lamps with 3000k and 4,000 K in different up/ downlight combinations for a couple of weeks per scenario.

Under the condition when we had the entire installation of 17000K lamps all day, we had a couple of colleagues who worked particularly late into the evening reported that they couldn't sleep at night, and started developing migraine headaches. So boosting alertness to alleviate 'after lunch' dip is one thing. But constantly over a long period of time, it doesn't work when affecting sleep pattern.

One needs to understand the limitations and implications, because they are manipulating hormones in our body.

As professionals, we need to be aware of our responsibility: what we design, what we do to people and to the environment, will have a long-term effect.

The changing nature of work

Post pandemic, we need to think about how we and where we work: why would people want to come back to the office, for what purpose? The trends were already there - this disruption has simply accelerated them.

Before the lockdown, the office space was often designed with banks of desks. So why would people actually want to come back to the office?

Being at home, I can switch from one meeting to another without having to travel or get onto a flight. And when I want to do very good high concentration work, I don't have anyone disturbing me.

What might attract us to come to the physical office space must be to truly interact, to co-create, to inspire, to exchange knowledge and to learn from each other.

That includes understanding how people use different kinds of spaces for work: is it really just about the desk, or it is a more about the collaborative spaces, spaces where we take a break from our work, places to ponder, reflect, contemplate and get inspiration too.

The pandemic is offering a chance to reflect on how we work, what might work better, and how that will change the lighting requirement.

Maybe for collaborative spaces, we can have a bit more fun, add a splash of colour and look for alternative lighting opportunities too.

Light at night

As lighting designers, we don't neccessarily want to light up the public space outside the immediate building with big poles and blanket the space with uniform schemes. Spill light from triple height glass windows may be sufficient for illuminating the immediate area outside, and additional lighting maybe needed to supplement and mark out entrances.

There is also a movement to introduce biodiversity net gain. So it's not just about designing to preserve what there is already, but also to consider the potential to put in a new landscape to restore biodiversity - for example introducing specific bats onto a site, even though that is not their normal habitat.

So with new development or regeneration schemes, we actually put something back to the planet, rather than keep taking resources and depleting it.

With regard to biodiversities, light at night can be an issue. But also an opportunity because rather than saying that there needs to be so many square meters of lighting coverage, you can look across the site to see where it's reasonable to focus on biodiversity and where not. For example to consider where people go- and where people don't go - or go less after certain hours.

So rather than just a canvas lighting scheme of one solution, that solution could actually be dynamically time-controlled: balancing the needs of the human, and the ecology.

It's a good challenge (more research needed) if we can make it work even better for the world.

Well, the care we need to take is beyond mitigation., If we were to plan for more urban greening, more ecology being introduced to the site, we need to understand and anticipate what's needed: what should be the right thing to do at nighttime, but also during the daytime. What do these species need?

It's a balancing act - professionals from different disciplines need to work together.

Need for lighting design education

There is always a perception that bringing a lighting professional onto a project is going to cost more because they're going to start specifying something a lot more expensive.

But bringing in a professional is actually very good value for money: they should be having a much deeper and rounded conversation, to diagnose and understand from the clients, from the architect or the designers, collaborators: how the space is going to be used, who is it for, and explore opportunities to add value and save money.

The design community loves talking to each other. It would be helpful also to spend time talking more to others explaining what good practice and design standards are like, to enable a layman gaining some basic understanding of what good quality lighting is about or what to look for.

I've sometimes been to friend's house when they've just switched to LED's. The colour quality is often so bad that it completely distorts your complexion. They don't realise that there's anything wrong with it because they just don't know what good could look like.

The general public needs better awareness of what good lighting could look like and what to look out for, even basic specifications on packaging - what colour temperature is for example - would make a big difference.

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Humanity-centred lighting: a holistic approach

A truly humanity centric approach will consider how light impacts people, the environment and ecology: how we plan, how we design our cities, our neighbourhoods, urban precincts from macro to micro scales, where we live through the 24 hour cycle.

Design and planning at the city level

An area that needs more work and progress.
When you start densifying cities and packing buildings much tighter together, daylight access into the buildings will become much more challenging. It doesn't matter how much glazing one installed, practically no daylight will get into the lower floors of a very narrow street..

So good design needs to go beyond an individual building. Sustainable and regenerative design has to be at all scales: when working with a space or a room, there's only so much you can do.

We want cities to be well designed, with the right balance of green infrastructure, and the right cityscapes for the climate to suit the geographical location etc… there is so much good lighting can contribute and add benefits. .

That's why Lighting is a very exciting, expanding profession.

If you care about light, there is just so much more you can do to change the world for the better.

Thank you!

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