Designers Lighting Forum

Rethinking the Ceiling: A Lighting Perspective

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March 13, 2019

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Learning Objectives

At the end of the this course, participants will be able to:

1. Understand the basic components and performance requirements of an integrated ceiling system.

1. Understand the current state of the art of integrated ceiling illumination systems.

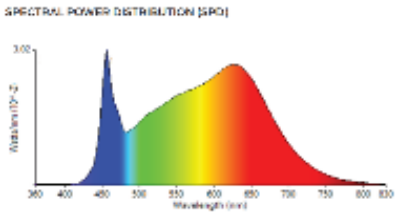
2. Understand the opportunities to integrate existing and emerging technologies, both lighting and non-lighting, into ceiling illumination systems.

3. Understand the challenges that the current specification process places on innovation that crosses disciplines and potential ways to address them.

WHAT DOES IT MEAN TO BE “INTEGRATED”?

The most successful technology of today is the integration of many earlier successful technologies

WHAT IS AN INTEGRATED CEILING?



Integrated Ceiling

The next revolution in lighting will be the integration of many earlier successful technologies

A GLIMPSE OF THE FUTURE?

WHAT IF….

- Ceilings were supplied as complete systems that include most or all of the various components that are today designed, ordered, and supplied by a variety of different disciplines and industries?
- Lighting was the basic building block of design, instead of trying to fit the lighting component into the design?
- Ceiling components were designed to work together in harmony not compete with each other for space?
- Purchasing, scheduling, logistics, and installation relied on a small number of suppliers?

WHO WOULD BENEFIT?

- Design Team: each area of expertise would spend more of their time ensuring that the design and specifications are correct, and less time managing and coordinating the interaction between ceiling components
  - Lighting designers would ensure light levels, beam angles, spectral power distribution, etc. meet the design requirements instead of ensuring luminaires don't clash with sprinklers and figuring out if they are all compatible with a particular control system
  - Interior designers wouldn't have to choose between good lighting and a good acoustic environment
  - Control specialists would manage a single, harmonized system
  - The design team would review a handful of submittals instead dozens
- Client: would receive a better solution where common compromises between ceiling components have been optimized
- General Contractor: would deal with a small number or even a single point of contact – increasing efficiency and reducing errors and conflicts

STARTING POINT: WHAT DOES A CEILING PROVIDE?

An overhead surface that all of the other ceiling components can be mounted to, including:

- Lighting
- Acoustic Materials
- Fire Suppression
- Sensors
- Security (surveillance)
- Audio
- IT Infrastructure
- HVAC

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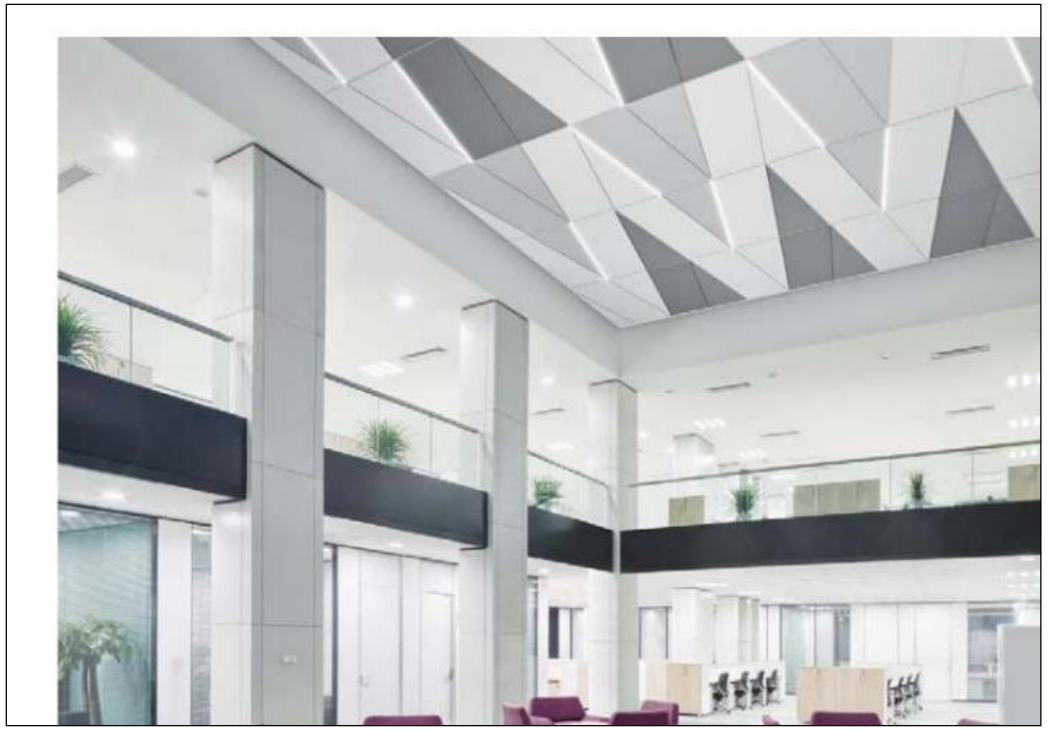
SO WHAT WOULD AN INTEGRATED CEILING NEED TO PROVIDE?

An overhead surface that all of the other ceiling components can be mounted to, including:

- Lighting
- Acoustic Materials
- Fire Suppression
- Sensors
- Security (surveillance)
- Audio
- IT Infrastructure
- Compatibility with HVAC

THERE ARE 2 APPROACHES TO INTEGRATION

1. Use the existing ceiling structure as a platform and add lighting options, fire suppression, IT infrastructure, etc.



Some of the integration challenges are addressed

> But what has really changed?

THERE ARE 2 APPROACHES TO INTEGRATION

2. Rethink the Ceiling

Light is arguably the fundamental element that influences the perception of a space

> What if lighting was the platform on which the ceiling is built?

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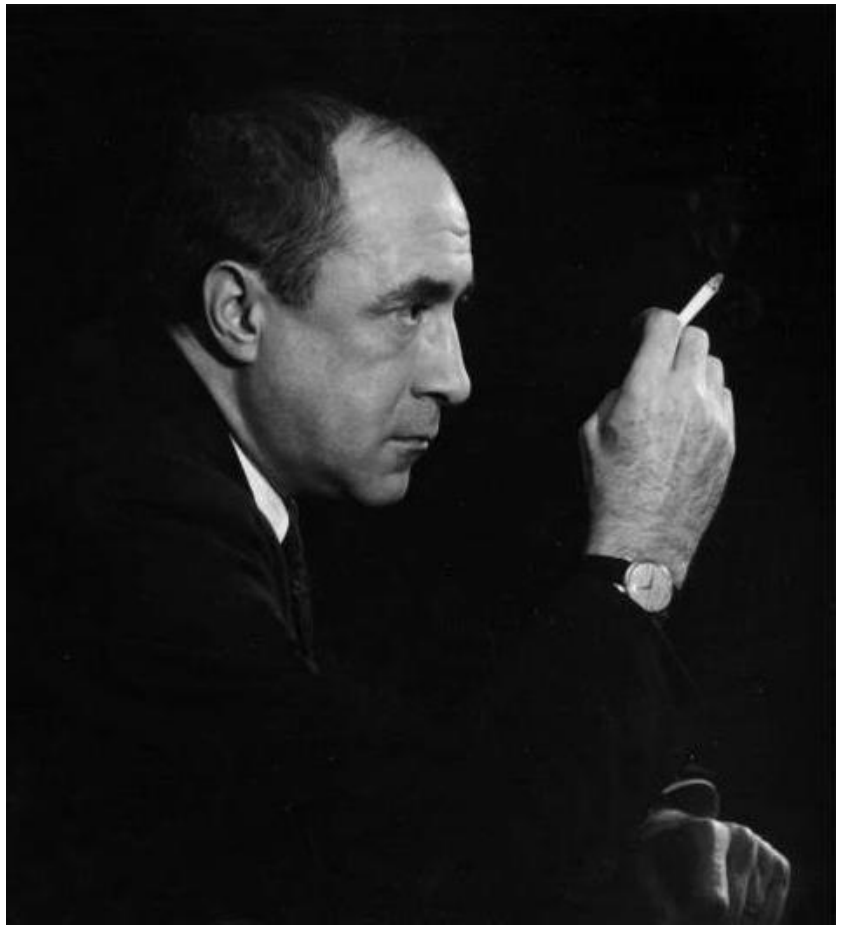
IN THE BEGINNING THERE WAS LIGHT…

BACK TO THE BASICS

If lighting is the basic building block for a new way, then the lighting part has to be done right.



Richard Kelly

To supply a complete lighting solution, an integrated ceiling must provide the "three elemental kinds of light effect"

- Focal Glow
- Play of Brilliants
- Ambient Luminescence

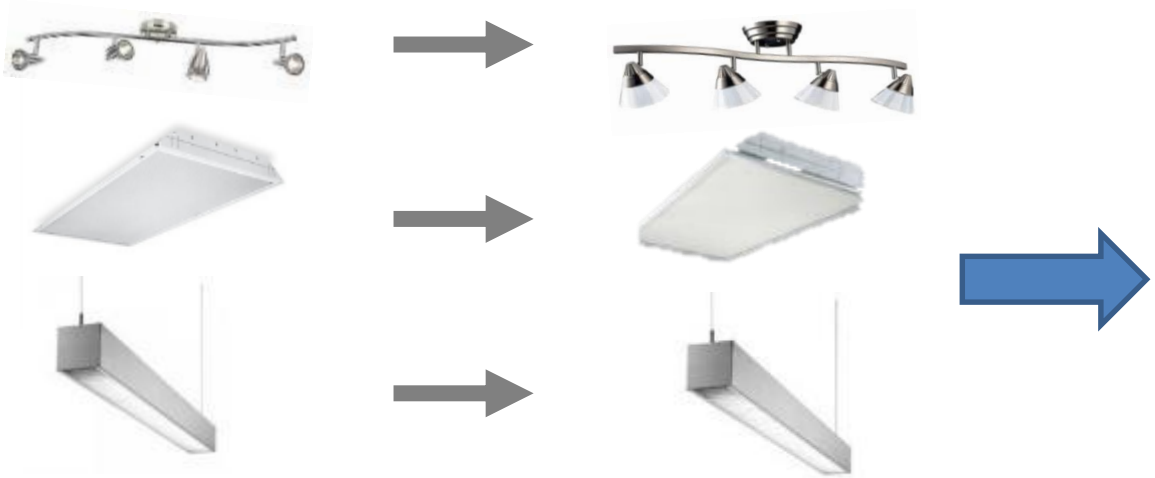
AMBIENT LUMINESCENCE

"THE UNINTERRUPTED LIGHT OF SNOWY MORNING IN THE OPEN COUNTRY"

" Ambient luminescence produces shadowless illumination. It minimizes form and bulk. It minimizes the importance of all things and people. It suggests the freedom of space and can suggest infinity. It is usually reassuring. It quiets the nerves and is restful" – Richard Kelly (1952)

- For most of human history, we lived outdoors under a large luminous surface…the sky. Not only have our eyes been adapted to illumination from the sky but *also our minds and our bodies.*
- The sky is a "canopy of light" that creates an entire experience encompassing visual, emotional, and biological contributions to human well being.
- *People spend almost 90% of their time indoors:* we are missing the natural canopy of light!

A NEW APPROACH NEEDS A NEW PLATFORM



Old Technology >>
Old Luminaires

New (LED) Technology >>
Old Way of Thinking

New Technologies >> New Way of Thinking

Evolution: The first light started as a 'point' and now have evolved into Points and Lines that are designed to fit into a ceiling

Revolution: Luminous Ceilings are a platform that provides comfortable general illumination AND a way to integrate other lighting and ceiling components

WHAT ABOUT STRETCH CEILINGS?

- Stretch ceilings are an established alternative to traditional ceiling structures
- They are an ideal platform on which to build
  - Aesthetic
  - Simple
  - Flexible
- But just like traditional ceilings, lighting – *if it is included* – is often treated as an addition (afterthought?)
- The lighting system is frequently not the primary design consideration

LUMINOUS CEILINGS

HOWEVER…

When illumination is the starting point, the important features of design become:

- the quality of light
- the interaction of light and materials
- the metrics of illumination

And the result is not just a fabric ceiling with some lights behind it but a Luminous Ceiling where the fabric is a diffuser

Illumination by Nature

Illumination by Luminous Ceiling

Luminous Ceilings provide the way to bring the feeling of the outdoors…inside

LUMINOUS CEILINGS ARE THE BEST WAY PROVIDE AMBIENT LUMINESCENCE

When visual comfort is the primary goal, it is the inherent size and quality of light in a luminous ceiling that deliver ambient luminescence

> To be successful it is essential that all of the characteristics of good lighting be present

FOCAL GLOW AND PLAY OF BRILLIANTS

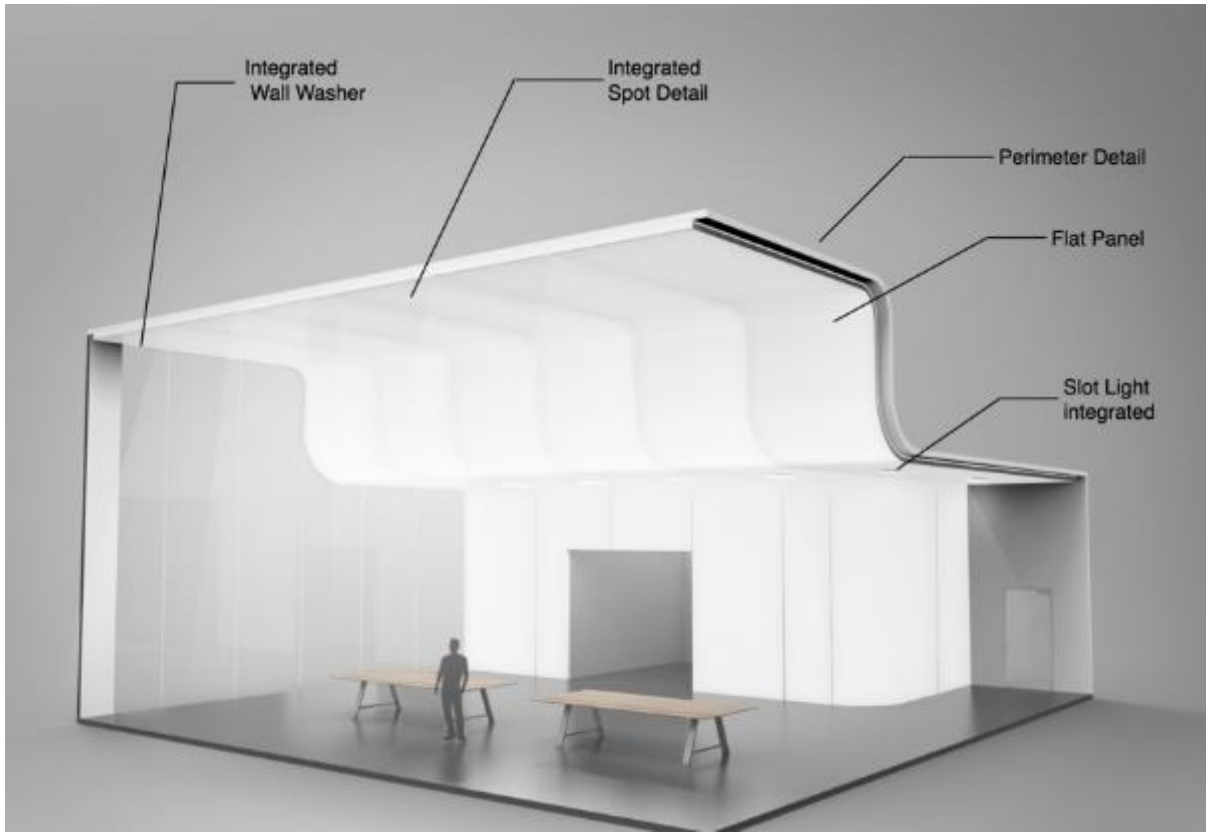
But illumination can be about more than perfect diffuse light: there are many times when contrast is required

The Luminous Ceiling platform allows the integration of track, downlighting, wallwashing, grazing, linear features and more

INTEGRATING THE LAYERS OF LIGHT

What are the important factors?

- Ability to support a variety of linear and point source lighting types: spots, floods, wallwashers, grazers, linear, etc.
- Minimizing the intrusion into space >> e.g. seamless/hidden visual appearance
- Mechanical integration
- Wiring simplification
- Accommodation for site variances
- Integrated Controls



INTEGRATING THE LAYERS OF LIGHT

What Does An Integrated Lighting System Allow You To Do?

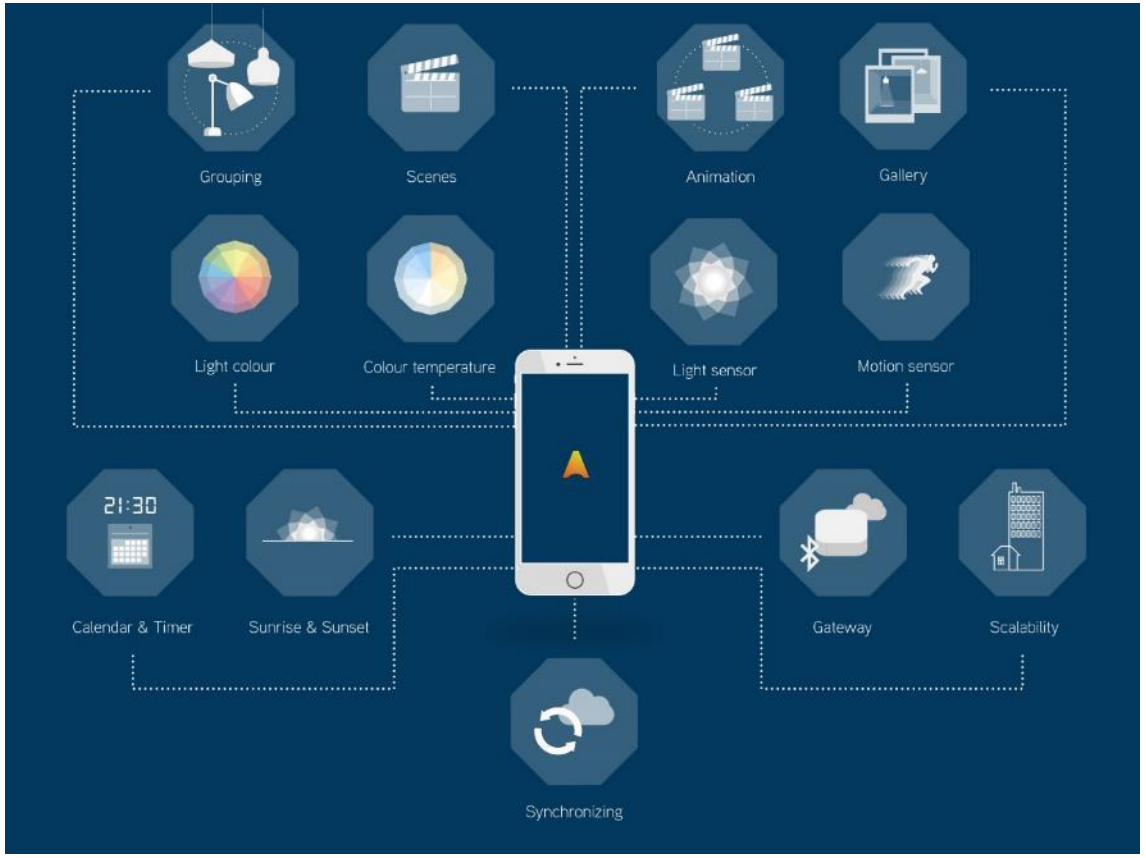
The key to a successful integrated ceiling lighting system will be to ensure that all of the luminaires can be controlled as a single unit allowing for flexibility and adjustability of….

- Illumination levels
- Contrast ratios
- Color temperature
- Aiming & beam angles
- Reaction to external illumination (daylight)

Imagine a lighting system where…

- All of the layers of lighting operate as a coordinated system on a single handheld controller that sets the parameters for all luminaires
  - CCT
  - contrast ratios
  - dim levels
- Aiming and beam shaping are done in concert with setting the subjective experience of the illuminated space
- Sensor input and two-way communications can define entirely new scenes to change the experience of the people encountering the space

THE TECHNOLOGY ALREADY EXISTS



The functionality of traditional lighting controls is available on your smartphone

The technology currently exists to electronically control all aspects of lighting

Aiming and beam shaping can be done wirelessly

The technologies exist – the revolution will be the integration into a single solution that combines all of the elements of good lighting

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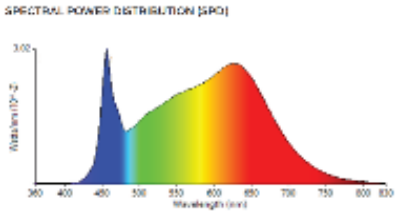
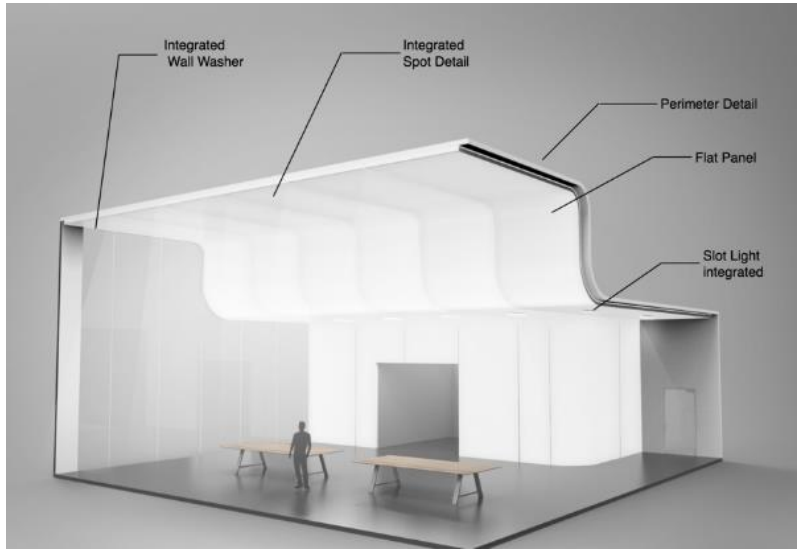
SO NOW WE'VE GOT THE PERFECT ILLUMINATION SYSTEM BUT THIS TALK IS ABOUT DELIVERING A "CEILING"





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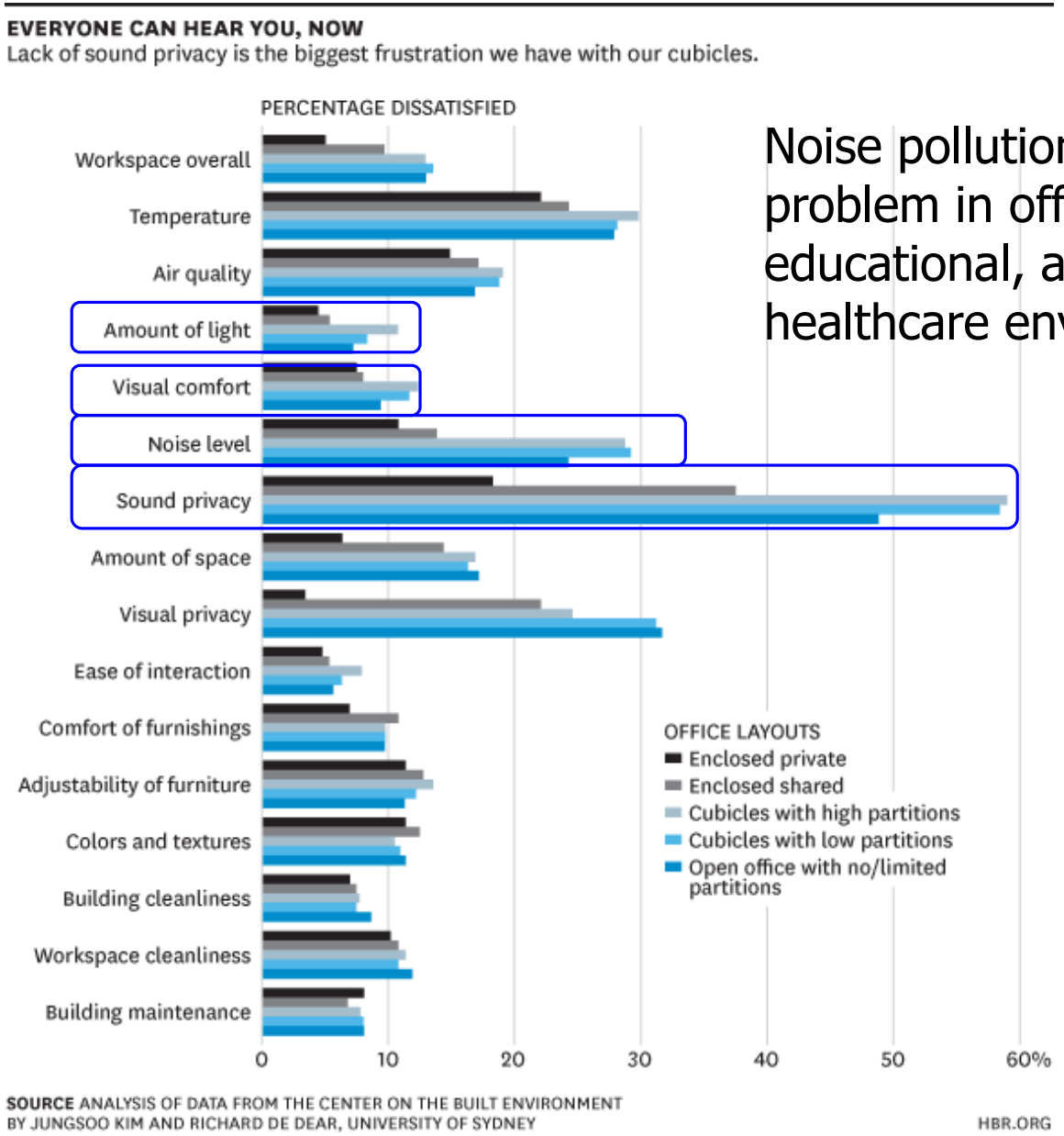
INTEGRATING NON-LIGHTING STUFF…

NOISE: THE BIGGEST PROBLEM



Noise pollution is a big problem in offices, educational, and some healthcare environments

"Studies indicate that approximately **80 percent of office workers** believe that their productivity would increase if their working environment was more acoustically private."

"A **300 percent increase in perceived 'worker satisfaction'** was reported as a result of the reduction in noise levels from conversational noise. In addition a measured **20% increase in sales productivity** was recorded at the end of the six months following the refurbishment."

American Society of Interior Designers; Armstrong World Industries, Inc.; DynaSound, Inc.; Milliken and Co.; Steelcase, Inc, 2005.

LIGHTING AND ACOUSTICS

Combining lighting and acoustics can be unattractive…

Approximately one kajillion track heads are used to provide general illumination to make room for acoustic panels

Lighting and acoustic clouds battle for space, making for a lot of clutter in the ceiling

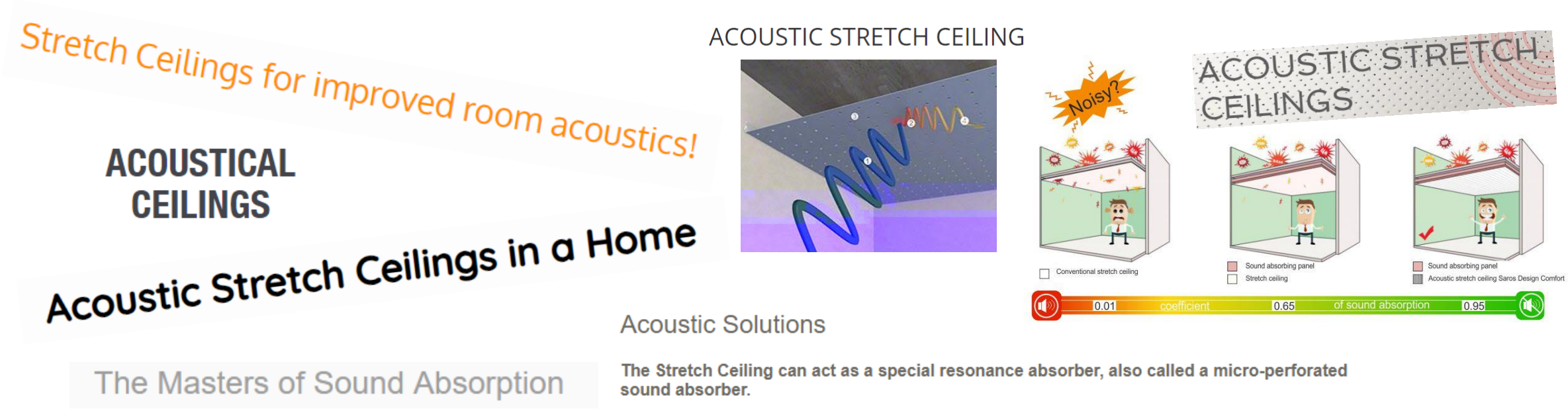
Funky interior design but the lighting…well….

Downlights are used for general illumination – where's the "ambient luminescence"?

Combining lighting and sound absorption usually results in compromising the quality of the lighting.

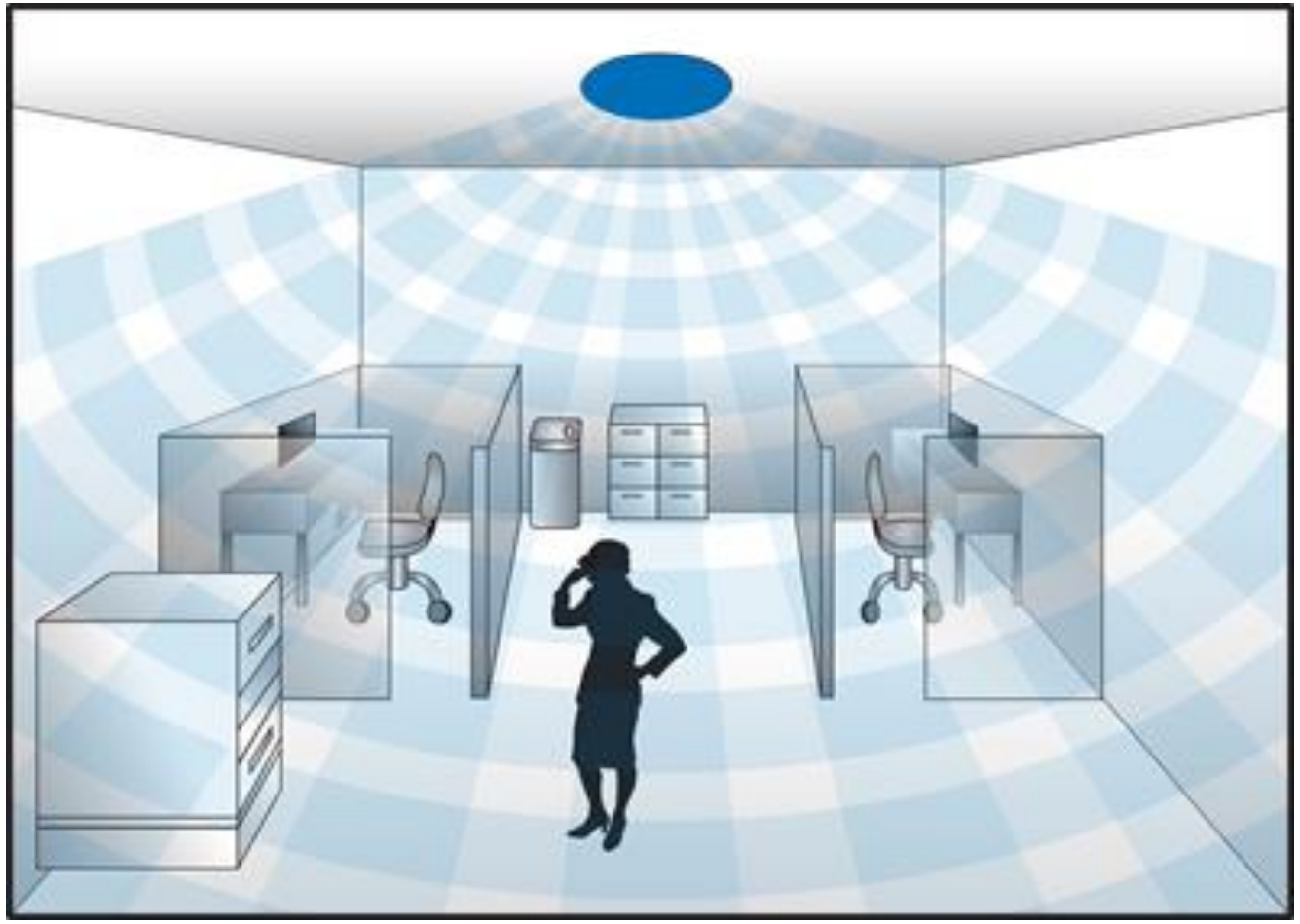
LUMINOUS CEILINGS WILL HELP

Stretch ceilings already offer noise reduction capability…



- The traditional points and lines approach to providing the primary layer of illumination contributes nothing to improving noise > the Noise Reduction Coefficient (NRC) value is typically = 0, indicating no sound is absorbed by the luminaire.
- Luminous ceilings based on the stretch ceiling platform have the ability to address the noise problem

SENSORS



- Today sensors are a critical part of energy management and code compliance
- In an integrated ceiling they will be used as one of primary inputs for creating responsive environments based on activity that go beyond dimming for energy savings

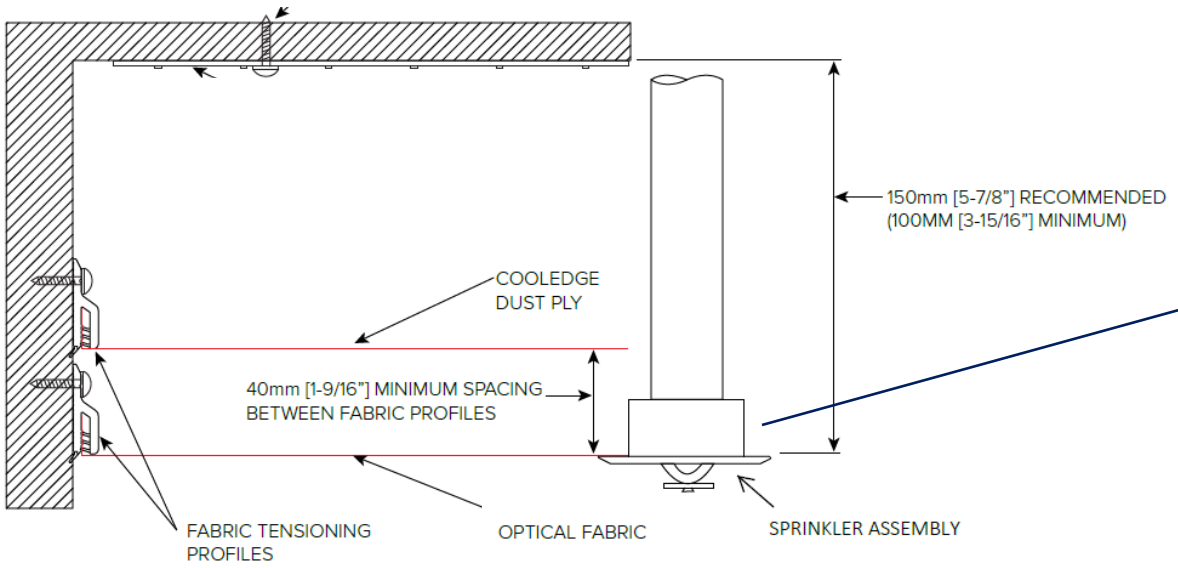
FIRE SUPPRESSION

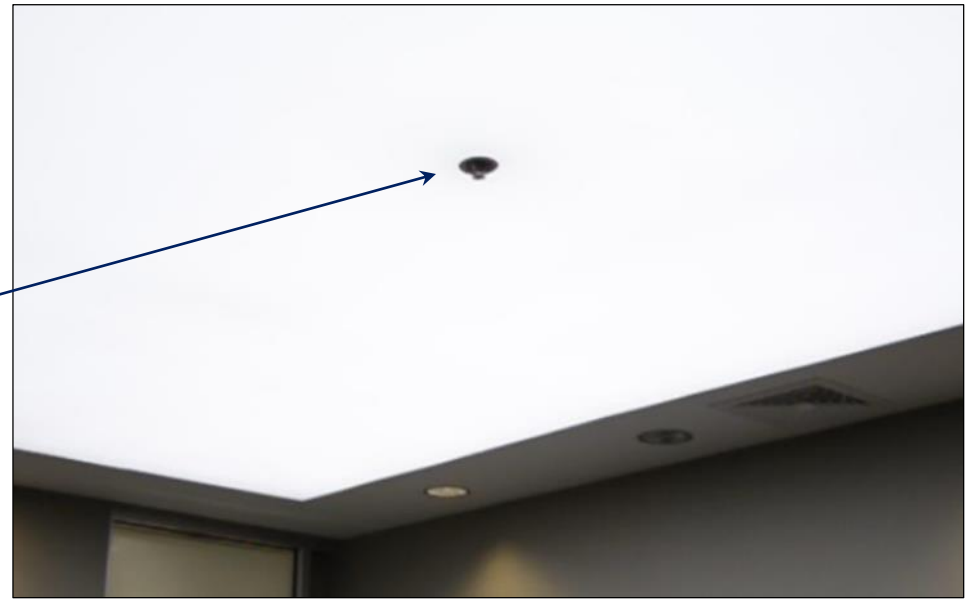
- Today: Same fixtures can act as either a luminaire OR sprinkler
- Tomorrow: It is possible for integrated ceilings to act as both luminaire AND sprinkler

Revolutionary LED Light and Fire Sprinkler

FIRE SUPPRESSION

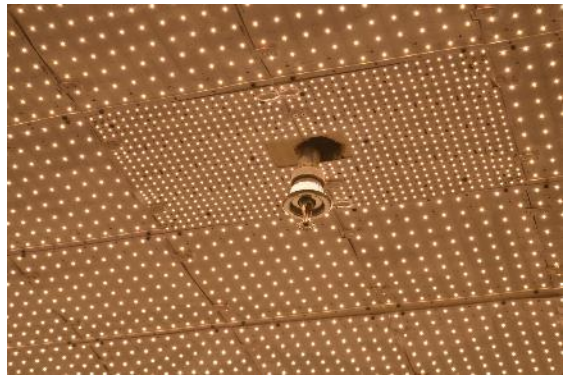
Stretch ceilings already offer the ability to integrate fire sprinklers





1. Cut holes in the dust ply and fabric diffuser

2. Press the escutcheon into place until secured



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THE OTHER ELEMENTS

Once the platform for integration based on luminous ceilings has been established there is no reason why other elements cannot be added…

Security

Audio

All it takes is a few extra cables….or a smartphone….

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WHAT'S NEXT?

SOME CHALLENGES AHEAD: WHO'S GOING TO DO WHAT?

Since 2004, construction has been divided into 50 pieces…

- Lighting/Electrical = Division 26 (16 in the old system for those of us who've been doing this awhile)
- Noise Control = Division 9
- Communications = Division 27
- Fire Suppression = Division 21

This presents the challenge of how to deal with products that cross multiple divisions representing multiple budgets

Integrated ceilings will require a holistic approach to design and construction. *Is this possible?*

WHAT WOULD THAT LOOK LIKE?

The integration of the ceiling will require a more integrated team to realize its value

SOME THINGS TO THINK ABOUT…

- Why do we continue to use points and lines to illuminate large areas?
- When people talk about human-centric lighting, shouldn't they be talking about human centric environments that include noise control, responsiveness, and adaptability?
- What does "value engineering" look like when applied to a complete solution?
- When the first flip phones came out, did you think you would watch TV on your phone?
- When LEDs first arrived in lighting, were you one of the people who said they would never replace conventional sources?

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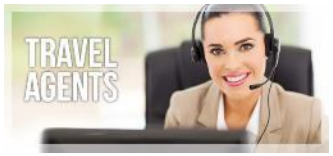
A FINAL THOUGHT…



The most successful technologies are the combination of many earlier successful technologies

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THANK YOU

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