

The image shows a modern building with a large glass facade at night. The OSRAM logo is illuminated in orange on the glass. The building's interior lights are visible through the windows, and the sky is a deep blue.

**OSRAM**

# Systems Thinking: Combining Hardware and Design Strategies

Lori Brock | 12 Nov 2014 | Detroit, MI  
2014 DOE SSL Market Development Workshop



# Lighting Technology is Changing

From:

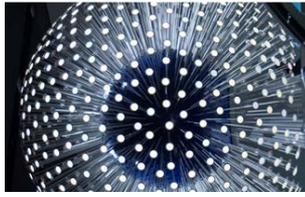
To:



# Lighting Focus is Changing

From:

To:



Light is design!



Light is life!



Light is dynamic!



Light is productivity!



Light is creation!



Light is smart!



Light is health!



Light is energy!



Light is vision!



Light is emotion!



Light is safety!



Light is yours!

# Lighting Industry is Changing

**From:**

- Components
- Hardware
- Product-Centric
- Binary



**To:**

- Solutions
- Software
- Human-centric
- Dynamic



# Lighting Industry is Changing

**From:**

- Components
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- Solutions
- Software
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- Dynamic

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**To:**

“Systems Thinking: Combining Hardware and Design Strategies”



## Focus on Applications

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The **systems thinking** and **user-experience design** approach places more emphasis on **metrics** appropriate for the **design-intended application** instead of **traditional lighting metrics** (CCT, CRI, LPW, etc.)

## Focus on People

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The lighting industry needs to spend **a lot less time** thinking about **light bulbs** and **a lot more time** thinking about **people**.

# Creating User-Experiences and Benefits that Conventional Lighting Cannot Provide

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## Enabling Science and Technology

- Tunable LED systems
- Sensors
- Software
- User-interfaces
- Light management systems
- Human factors

→ *All has to fit together seamlessly*

# Projects, Benefits and Systems Challenges

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## Examples

- Healthcare
- Hospitality
- Office
- Retail



# Nemours Children's Hospital - Orlando, FL, USA



Innovative lighting supports the hospital's mission to create a healthcare facility 100 percent focused on the needs of children and their families.

Lighting designer: Anjan Sarkar, CD+M; Architect: Stanley Beaman Sears



# Nemours Children's Hospital - Orlando, FL, USA

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## Vibrant, Interactive Lighting in Healthcare



Lighting provides engagement, distraction and stress reduction for patients and visitors

Lighting designer: Anjan Sarkar, CD+M; Architect: Stanley Beaman Sears

# Jammertal Golf & Spa Resort – Datteln, Germany

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## SSL solution for a wellness hotel



### The challenges:

- Creating an aesthetically-pleasing environment that supports daily activities and nocturnal recovery
- Customizing and integrating the LED system
- Fixtures that are highly durable in damp areas such as the showers and salt water spa
- Slim fixture profiles that allow for installation in the shallowest of alcoves

# Jammertal Golf & Spa Resort – Datteln, Germany

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## Stress, fatigue and discomfort were reduced



Study shows that well-being and recovery can be enhanced by **chronobiological** lighting conditions. Quality of sleep was increased and nighttime restlessness was reduced.

For more information on the study and the effects of the lighting at Jammertal Golf & Spa Resort, please visit <http://wck.me/3zr>

# Context-Aware Tunable Office Lighting

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Office Illumination that responds automatically to fulfill the instantaneous needs of the occupants

Challenges:

- Infer the lighting needs of the occupants based on the detected activities within the application (with no conscious effort on the part of the occupants)
- Optimize the lighting needs of the occupants taking into account individual user preferences



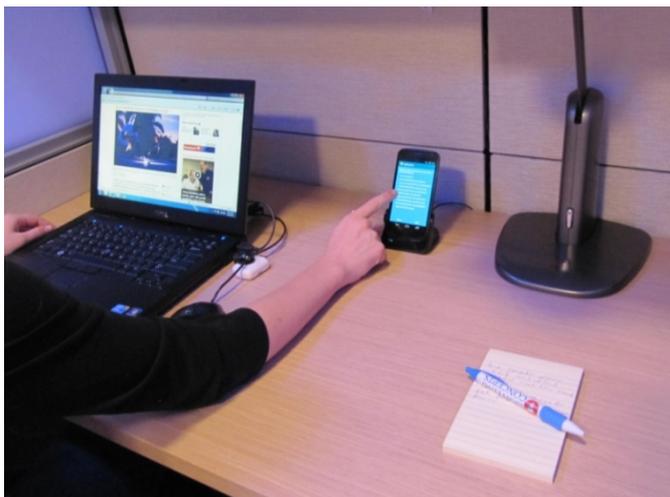
*Project is in collaboration with Jason Nawyn and Kent Larson, MIT Media Lab.*

# Context-Aware Tunable Office Lighting

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## Incorporates technology areas

- Sensing platform
- Activity recognition engine
- Tunable (RGBY) LED system
- User interface
- Human factors



# Human-Factors Testing: Because SSL and energy savings are irrelevant if nobody likes it!



- Multi-zone office
- Participants worked individually for 2 days each

Customizable Illumination	Options
White light CCT	2800K, 3500K, 4500K
Color in unoccupied zones	Deep Blue, Sunset Orange, Light Blue, Orchid Pink, Jade, Magenta, Light Gold, Dim White, Lights Off
Light level, unoccupied zones	Level 1, Level 2, Level 3
Light level, using computer	Level 1, Level 2, Level 3

## User Reaction to Context-Aware Office Lighting

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- Fun, stimulating, fancy, very pleasant, enjoyed...
- Personalization important
- Automation concept appreciated, facilitates emotional component to lighting
- Potential to improve work environment via lighting:  
Support worker comfort, satisfaction, inspiration, productivity, creativity

# Transform a Retail Dressing Room Into a Virtual Reality Experience

Emphasis on fun, realistic, and dynamic environment



*Yesterday's dressing room: Poor lighting with harsh shadows*



*Best dressing room: Enhanced UX*



# Real Images, Lighting Conditions, and Sounds are Measured and Recreated

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First, the desired scene is filmed and light measurements are made.



Next, the scene is downloaded and selectable via tablet in the dressing room.



Finally, customers try on clothes in a wide variety of venues.

# Retail Dressing Room Experience

## Daniela Corte, Boston MA



# Retail Dressing Room Experience

## Daniela Corte, Boston MA

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<https://www.youtube.com/watch?v=HoFx8w2ettA>

## Industry Challenge

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Lighting metrics (CCT, CRI, CQS, LPW, etc.) are not the primary metrics for retail

- Sales revenue
- Foot traffic
- Customer dwell time
- Return rate
- Customer satisfaction, etc.

# Projects in Many Applications Show the Way

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Pain therapy



Hospitality



Retail



School



Office



Nursing homes



Hospital



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