

U.S. Department of Energy

LIGHTING R&D WORKSHOP

Co-sponsored by the Illuminating Engineering Society

Ideal Lighting ... Design Software

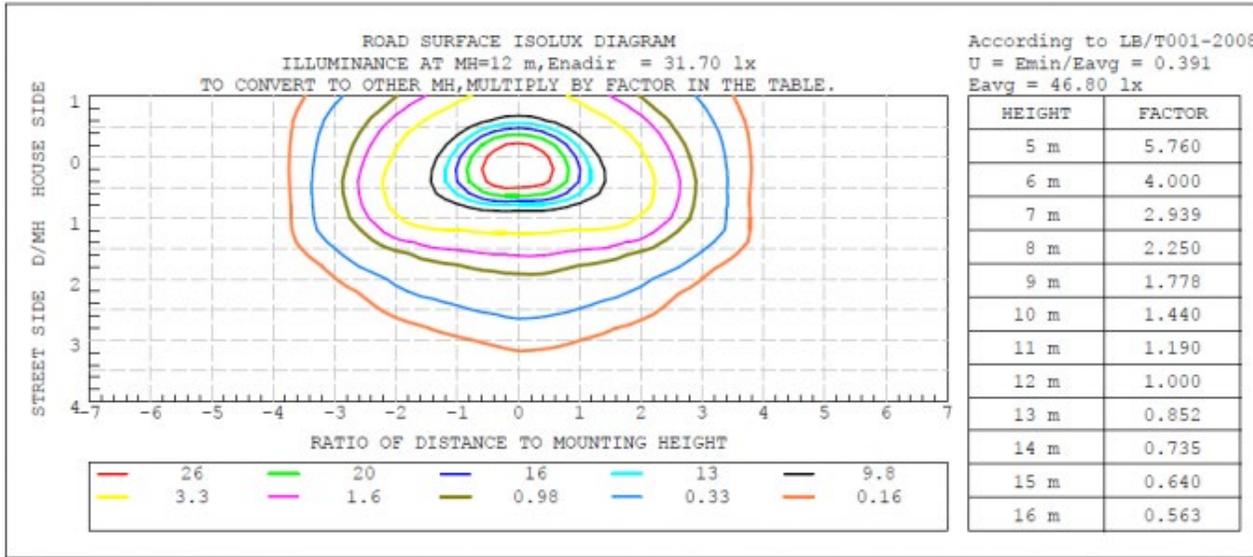
Ian Ashdown, P. Eng. (Ret.)
Senior Research Scientist
SunTracker Technologies Ltd.

Session: What is Ideal Light?

February 1st, 2021

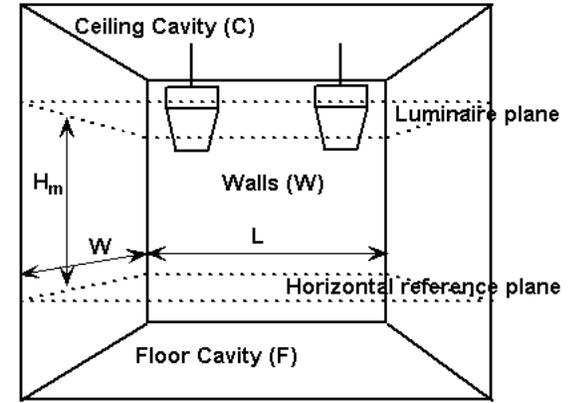
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Lumen Method

$$k = \frac{a * b}{h * (a+b)}$$



Point-by-Point

“Forget the numbers ... what is my design going to look like?”

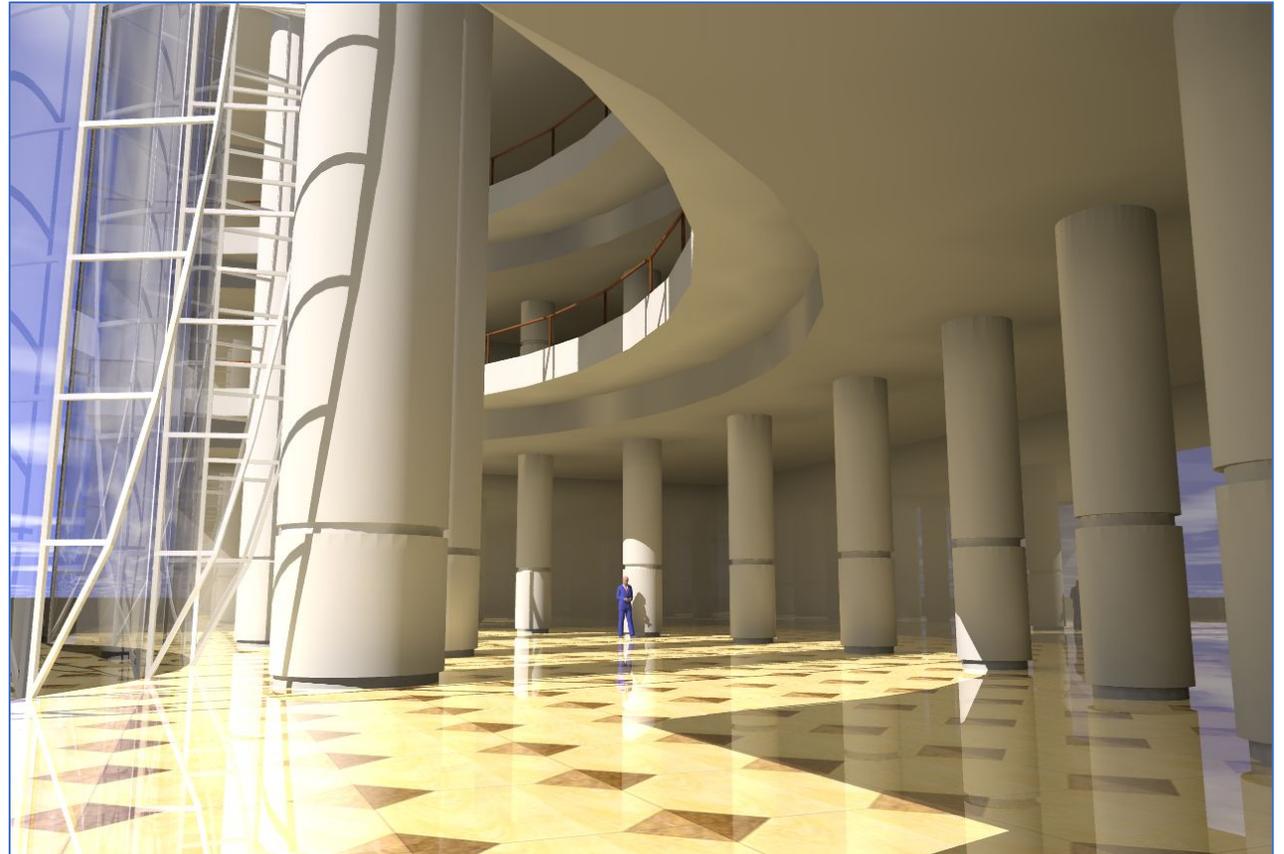
Anonymous

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Lighting Design Software Today

- Physically realistic renderings
- Illuminance and luminance
- Visual glare (UGR)
- Daylight factor (DF)
- Spatial daylight availability (sDA)
- Annual Sunlight Exposure (ASE)



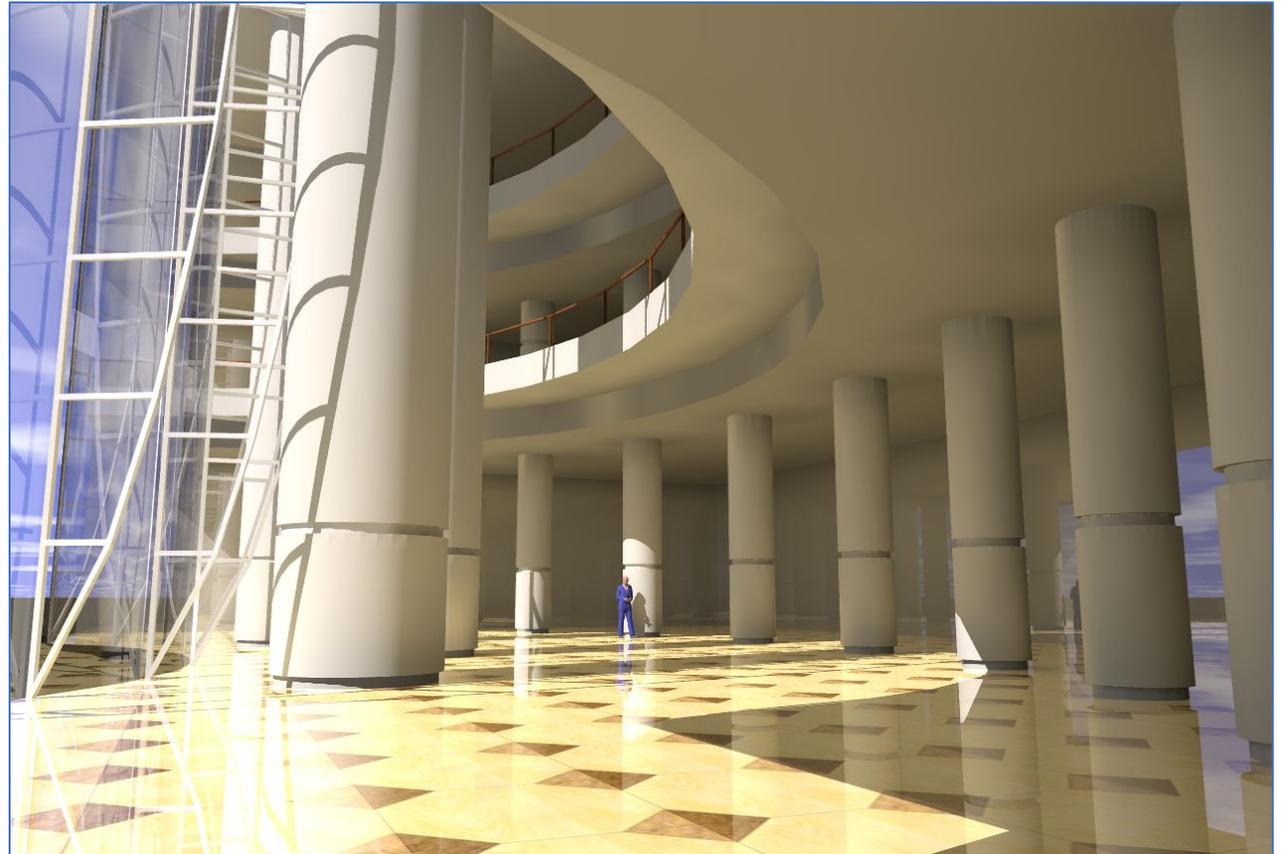
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- Physically realistic renderings
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- Spatial daylight availability (sDA)

NOT IDEAL



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Lighting Design Software Tomorrow

- Visualization
 - Lighting controls
 - Color-changing
 - Dynamic lighting
 - Adaptive lighting
- Virtual sensors
 - Color vision
 - Circadian
 - Germicidal
 - Horticultural



The Jetsons circa 1963 – © Hanna-Barbera Productions

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Lighting Design Visualization

- Networked lighting controls
- Color-tunable luminaires
- Building façade lighting
- Adaptive streetlighting



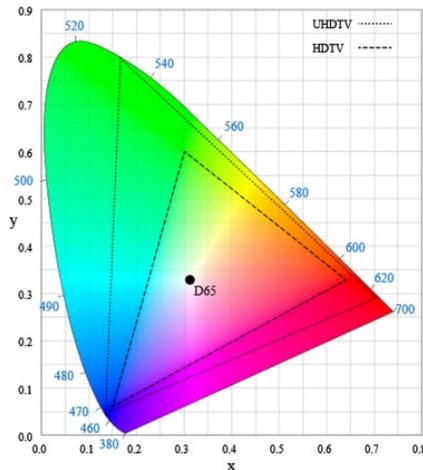
Samuel de Champlain Bridge, Montreal

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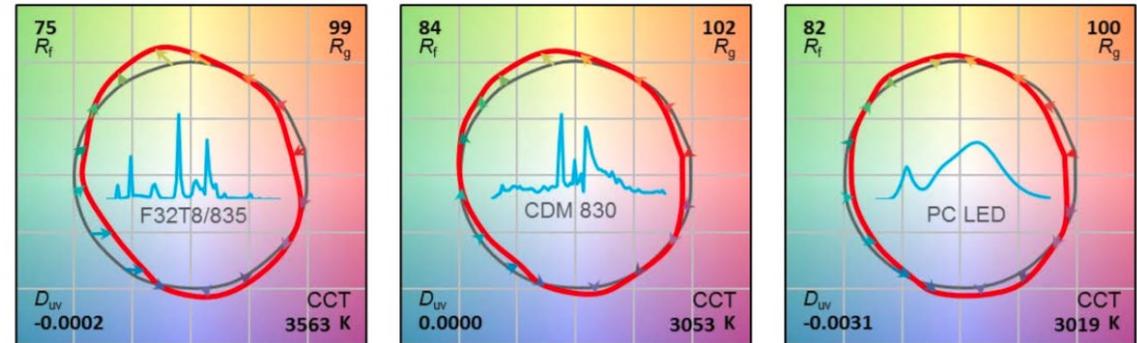
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Virtual Sensors

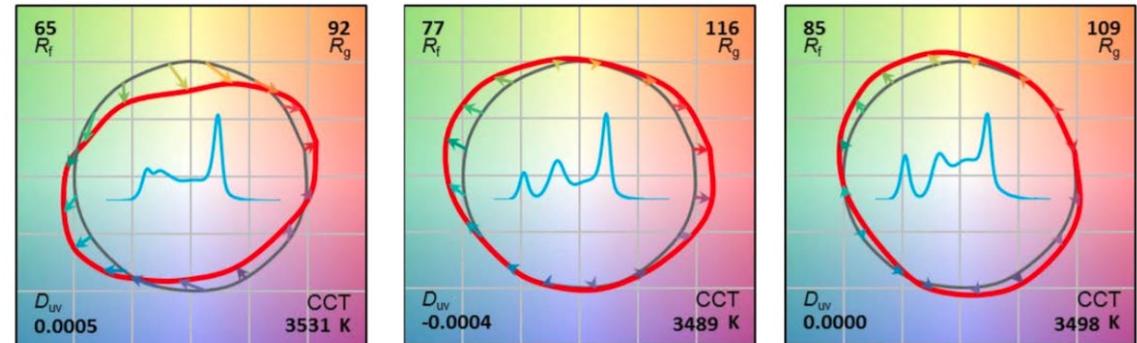
- Human Vision
 - Color sensor (CIE xyY)
 - Color rendering (TM-30)
 - Spectroradiometer



Commercially Available Sources

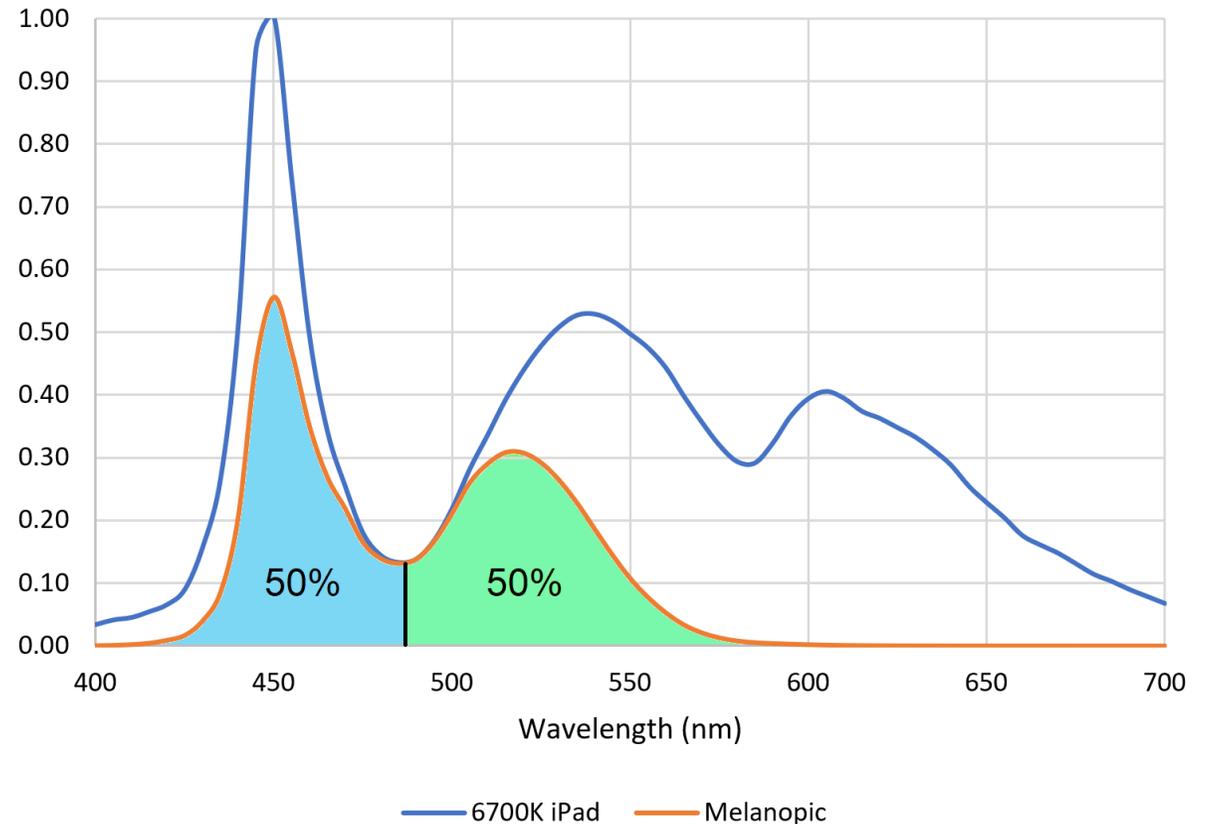


Experimental LED Sources



Virtual Sensors

- Circadian-based lighting
 - Melanopic luxmeter
 - Circadian dosimeter

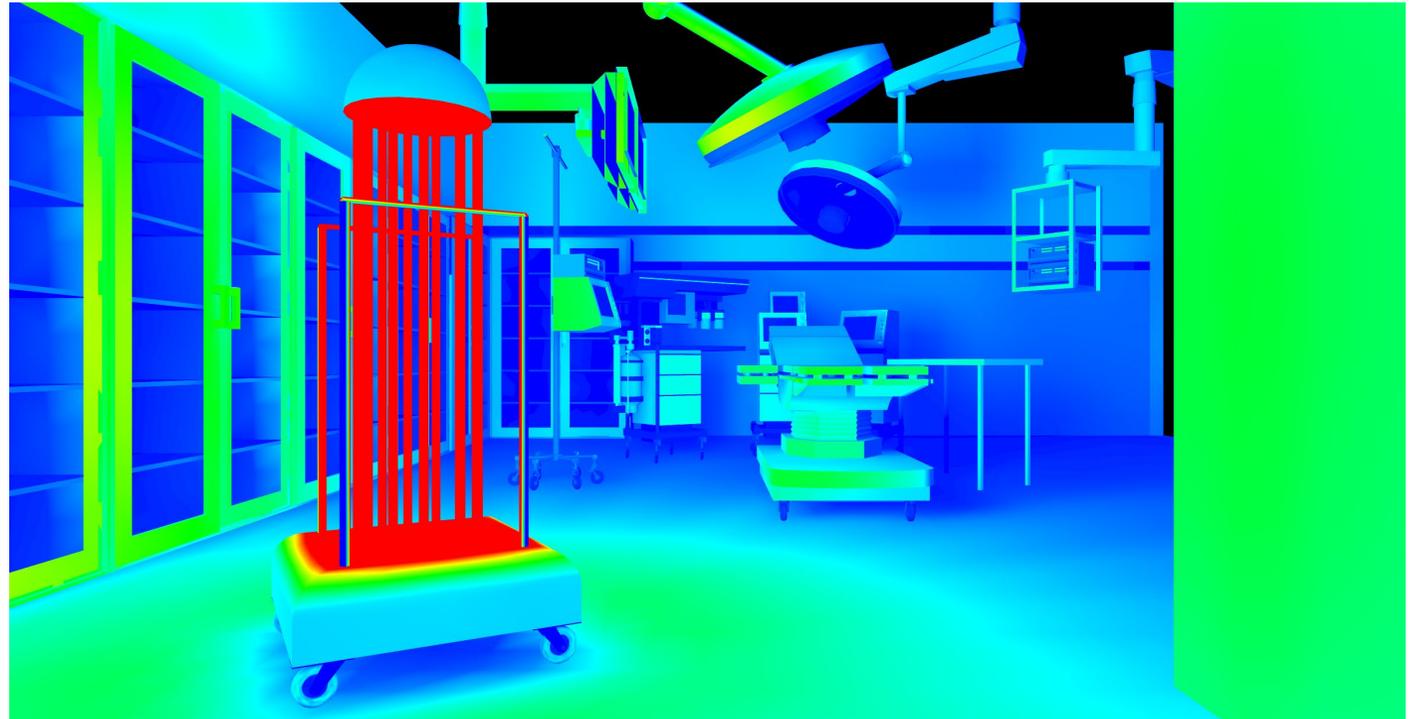
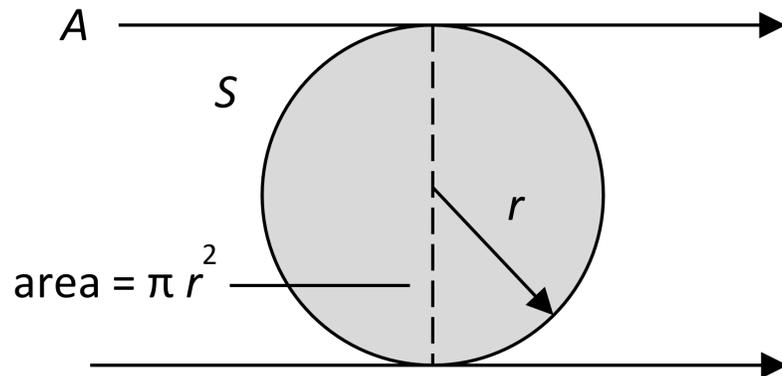


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Virtual Sensors

- Germicidal
 - UV-C irradiance
 - UV-C fluence rate

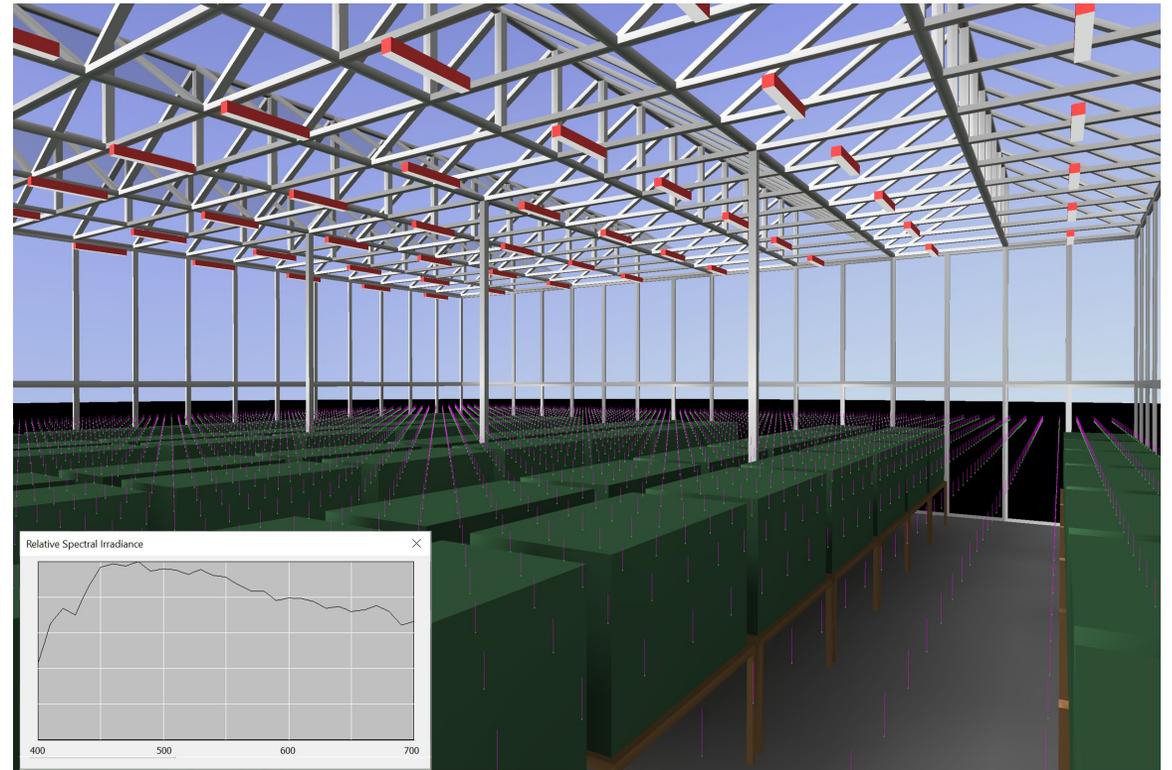


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Virtual Sensors

- Horticulture
 - PAR (quantum) sensors
 - Daily Light Integral (DLI)
 - Spectroradiometer



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Lighting Design Software ~~Tomorrow~~ **TODAY?**

- All tools and features discussed here have been implemented and validated
- Experimental lighting design software only
- Commercial availability dependent on market demand



Pieter Gerritsz van Roestraten

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Thank You

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