

## Inspiration vs. Technology – LED was Yesterday

Christian Hochfilzer

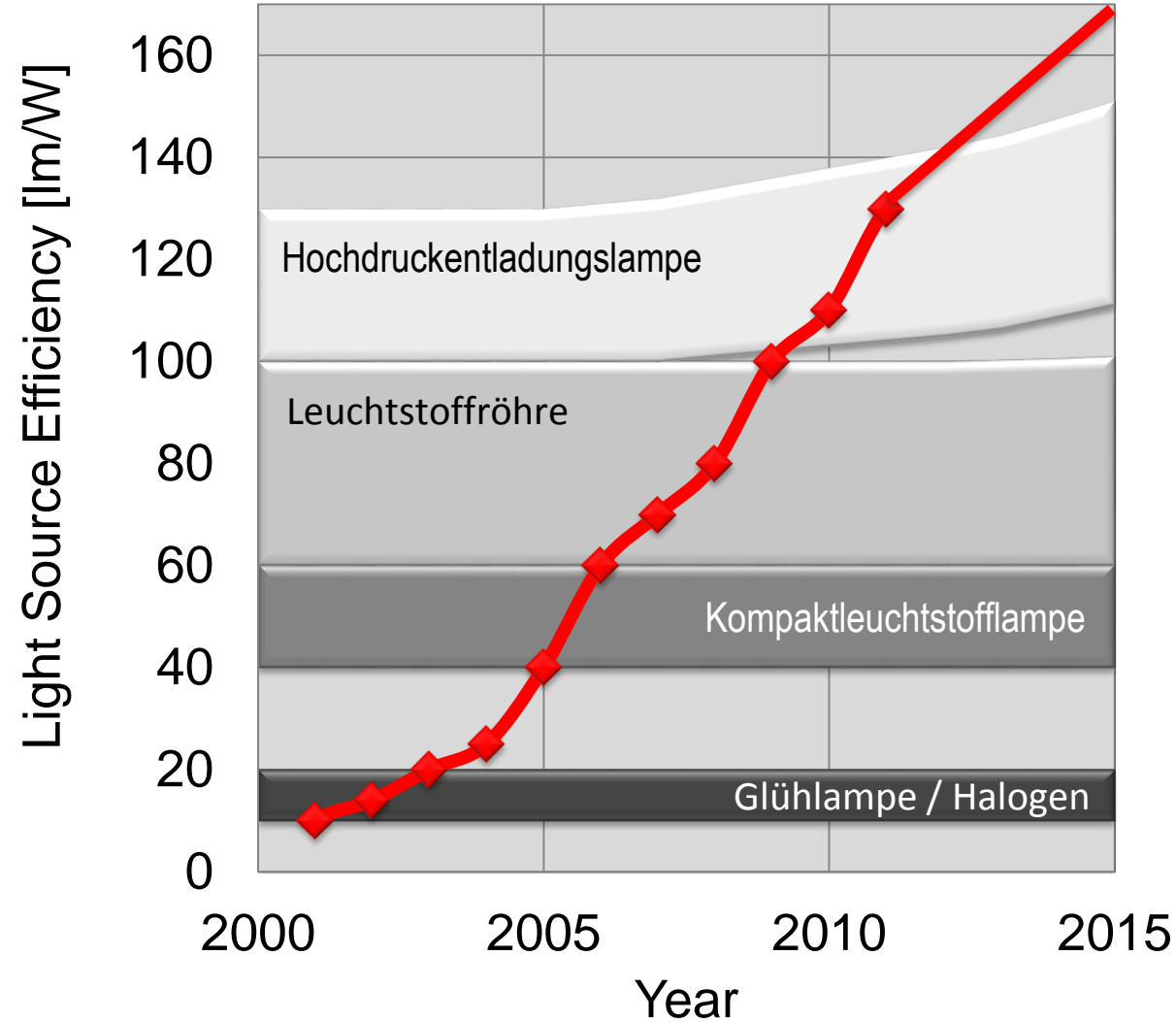
Swissphotonics

12.12.2016

Pantheon Muttenz

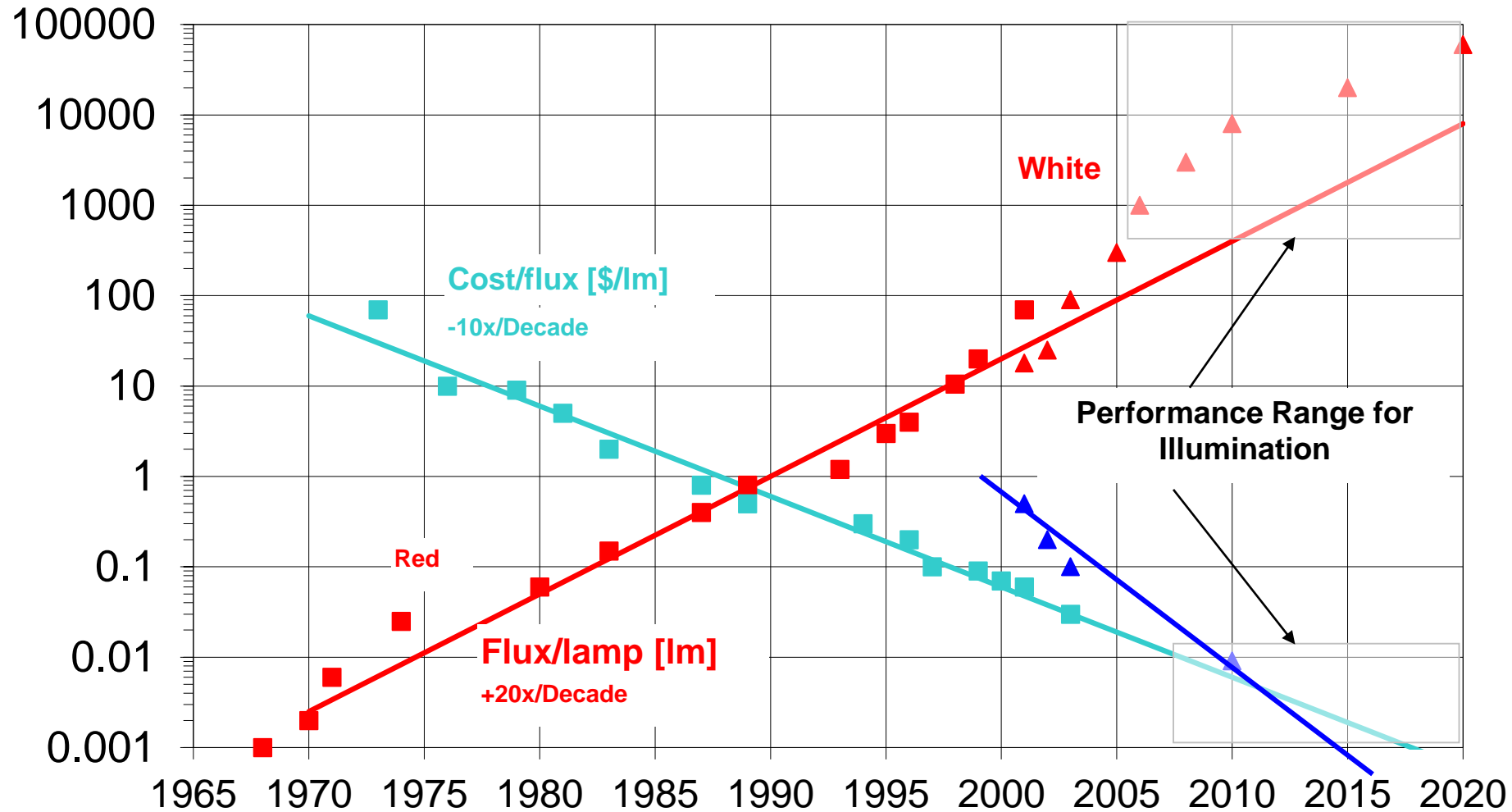
# Solid State Light Source – Efficiency vs. Conventional Light Source.

Years of Disruptive Change.



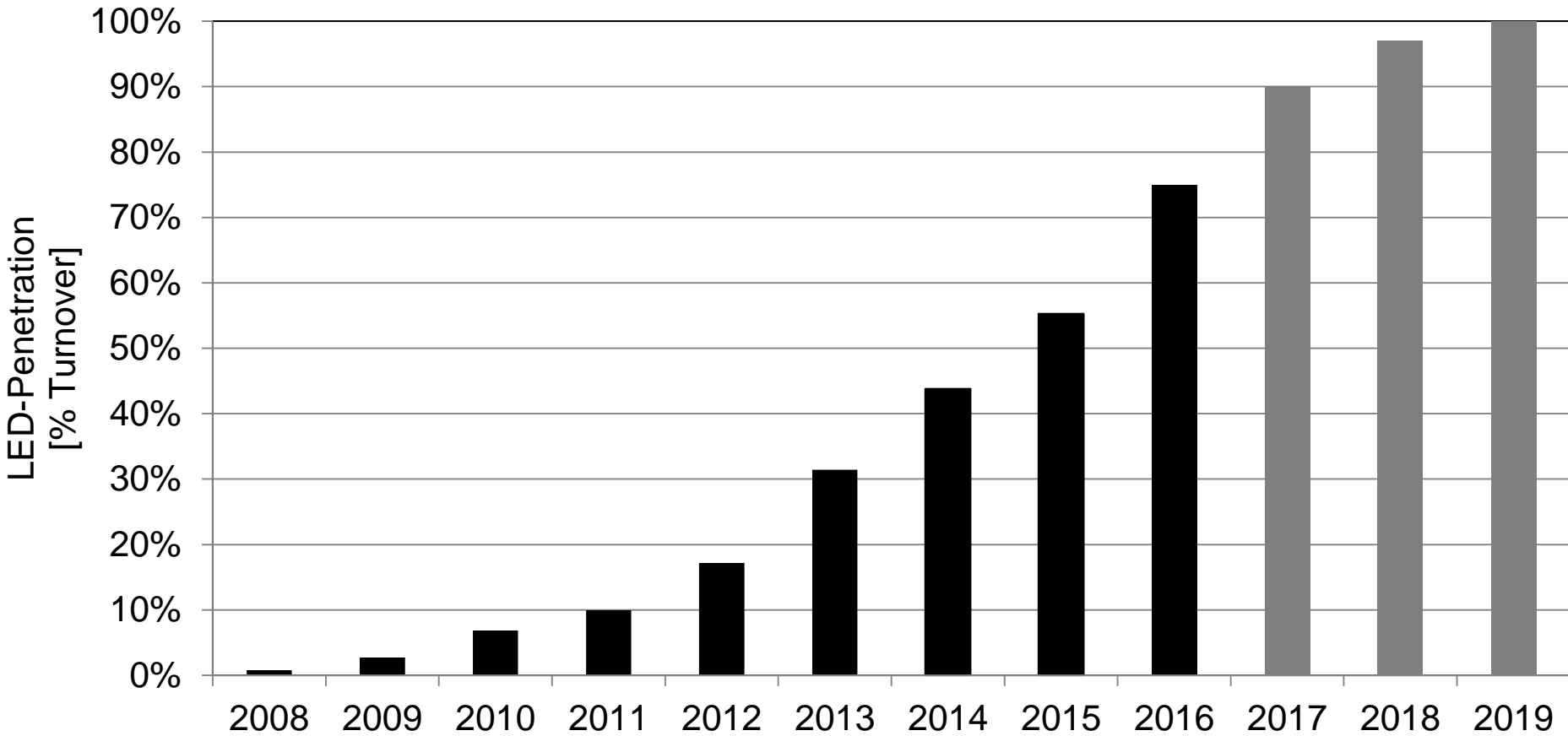
# Solid State Light Source – Cost Erosion according to the Haitz Law.

The Enabler for Market Penetration.



# Solid State Light Source.

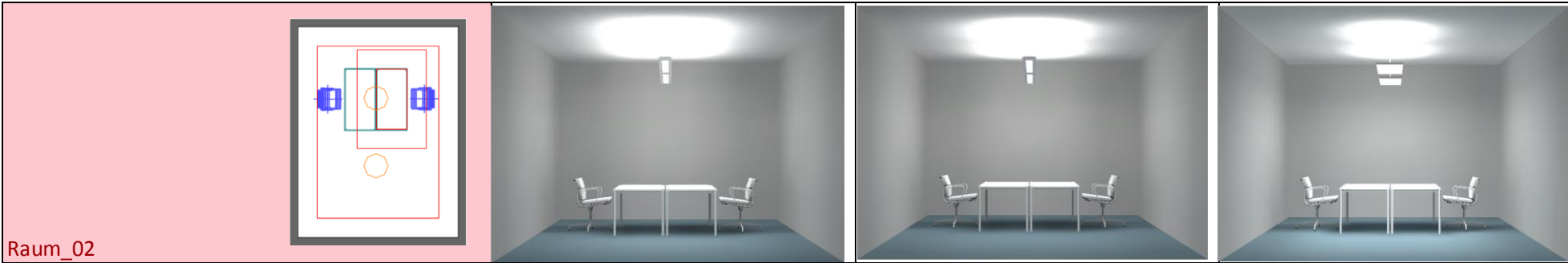
Professional Lighting Market Penetration in DACH.



# The Application – from Conventional via LEDification to Fully Integrated SSL\*

## Case Study: Energy Efficient Office Illumination

\*SSL – Solid State Lighting



Illuminance according to regulations ( $\geq 500\text{lx}$ )

Raum_02			
2 AP Sehaufgabe $E_m > 500$	501 lx	504 lx	500 lx
Sehaufgabe, $U_0 > 0.6$	0.69	0.72	0.65
Umgebung, $E_m > 300$	454 lx	653 lx	442 lx
Umgebung, $U_0 > 0.4$	0.5	0.55	0.4
Hintergrund, $E_m > 100$	351 lx	375 lx	317 lx
Hintergrund, $U_0 > 0.1$	0.56	0.61	0.45
Decke, $E_w > 50$	644 lx	763 lx	259 lx
Decke, $U_0 > 0.1$	0.17	0.14	0.21
<b>Vertikale Beleuchtungsstärke</b>			
Wand N (03), $E_w > 75$	168 lx	194 lx	117 lx
Wand N (03), $U_0 > 0.1$	0.72	0.74	0.67
Wand S (01), $E_w > 75$	161 lx	187 lx	107 lx
Wand S (01), $U_0 > 0.1$	0.75	0.75	0.63
Wand O (02), $E_w > 75$	162 lx	192 lx	111 lx
Wand O (02), $U_0 > 0.1$	0.7	0.68	0.56
Wand W (04), $E_w > 75$	168 lx	200 lx	117 lx
Wand W (04), $U_0 > 0.1$	0.69	0.68	0.55
Gesamtleistung pro Fläche (22.5 m <sup>2</sup> )	6.67 W/m <sup>2</sup>	6.22 W/m <sup>2</sup>	3.29 W/m <sup>2</sup>
Gesamtleistung pro Fläche/100 lx (22.5 m <sup>2</sup> )	1.7 W/m <sup>2</sup> /100 lx	1.52 W/m <sup>2</sup> /100 lx	0.9 W/m <sup>2</sup> /100 lx

Required electrical power per m<sup>2</sup> to achieve this illuminance

# The Luminaires – from Conventional via LEDification to Fully Integrated SSL

## Case Study: Energy Efficient Office Illumination

Optimised  
Luminaire with  
Flouresent Tube



6.7 W/m<sup>2</sup>

LEDified  
Luminaire



6.2 W/m<sup>2</sup>

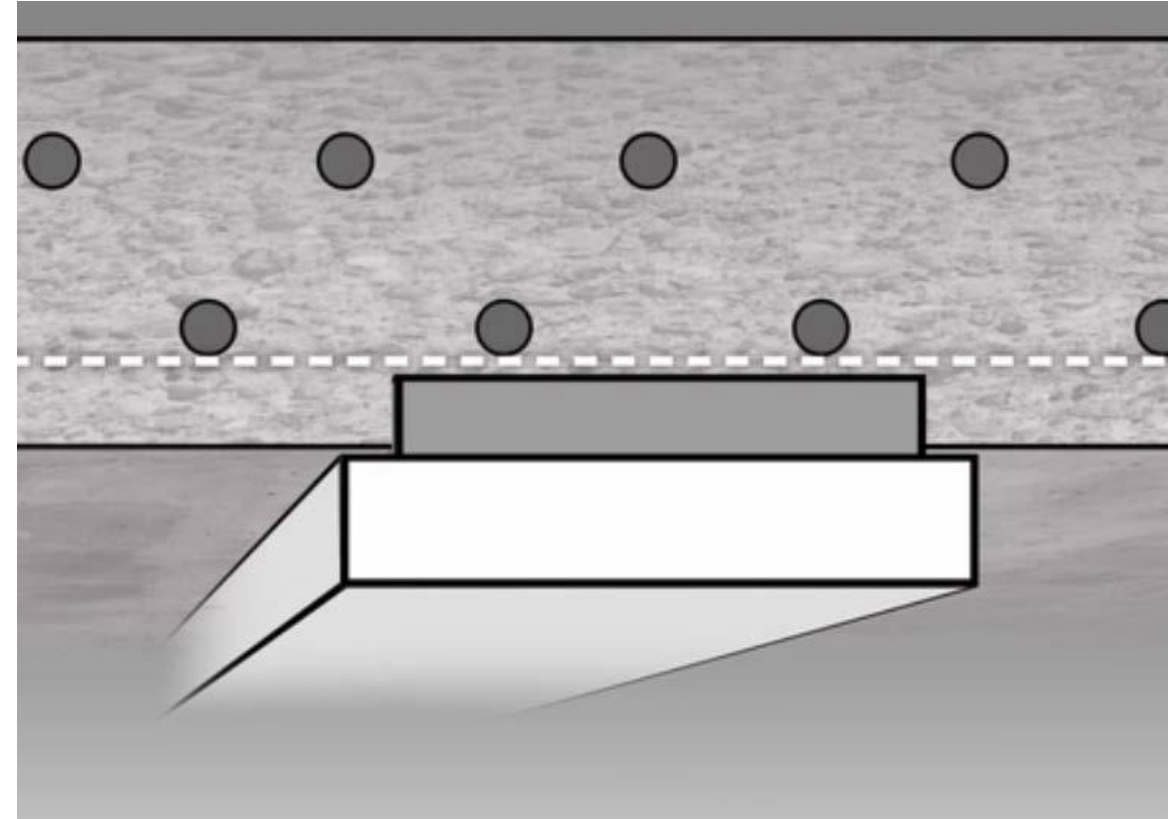
Integrated SSL  
Luminaire



3.3 W/m<sup>2</sup>

# Purelite – Fully Integrated SSL.

Easy to integrate into the building – for the planner and at the construction site.





# Purelite – Fully Integrated SSL.



35mm  
make the  
Difference



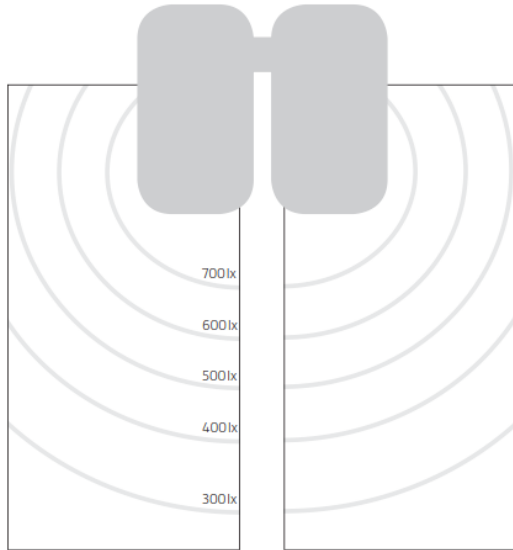
# Lightpad – Fully Integrated SSL. Free Standing Uplighter.



# Lightpad.

We slightly changed the light distribution – with major impact for our customers.

## HERKÖMMLICHE STEHLEUCHTE



Draufsicht auf Arbeitsplatz. Vergleich der Lichtverteilung im Bereich der Sehauflage

## LIGHTPAD

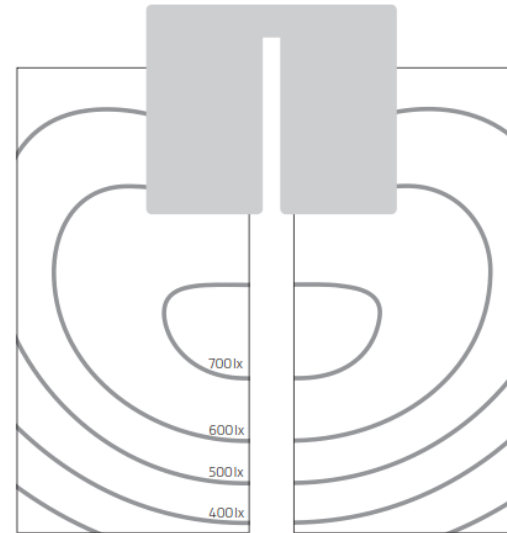
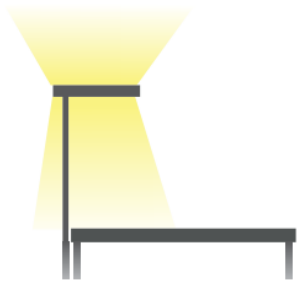


Tabelle 5.26 — Büros

Ref. Nr.	Art des Innenraum(bereich)s, des Bereichs der Sehauflage oder des Bereichs der Tätigkeit	$E_m$ lx	$UGR_L$ -	$U_0$ -	$R_a$ -
5.26.1	Ablegen, Kopieren, usw.	300	19	0,40	80
5.26.2	Schreiben, Schreibmaschinenschreiben, Lesen, Datenverarbeitung	500	19	0,60	80
5.26.3	Technisches Zeichnen	750	16	0,70	80
5.26.4	CAD-Arbeitsplätze	500	19	0,60	80
5.26.5	Konferenz- und Besprechungsräume	500	19	0,60	80
5.26.6	Empfangstheke	300	22	0,60	80
5.26.7	Archive	200	25	0,40	80



Seitenansicht auf Arbeitsplatz. Vergleich der Lichtverteilung

The Light is  
Centered  
Below the  
Luminaire



The Light is  
evenly distributed  
at the Table

# Lightpad.

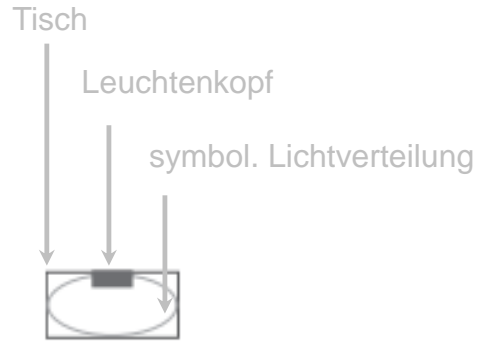
Customers can plan their office illumination together with their table plan.



A



B



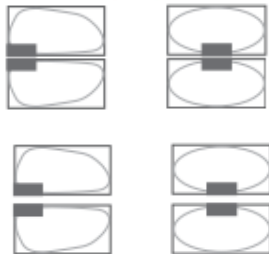
C



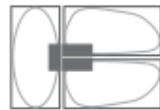
**EINZELTISCH**



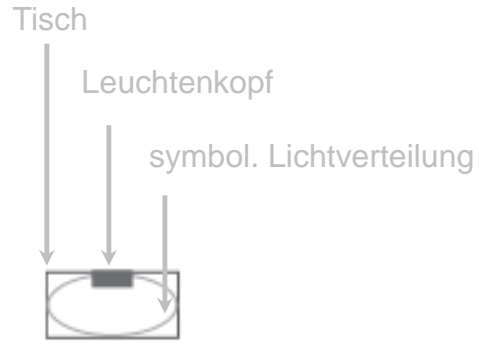
**ZWEIERTISCH**



**DREIERTISCH**



**VIERERTISCH**



Tisch

Leuchtenkopf

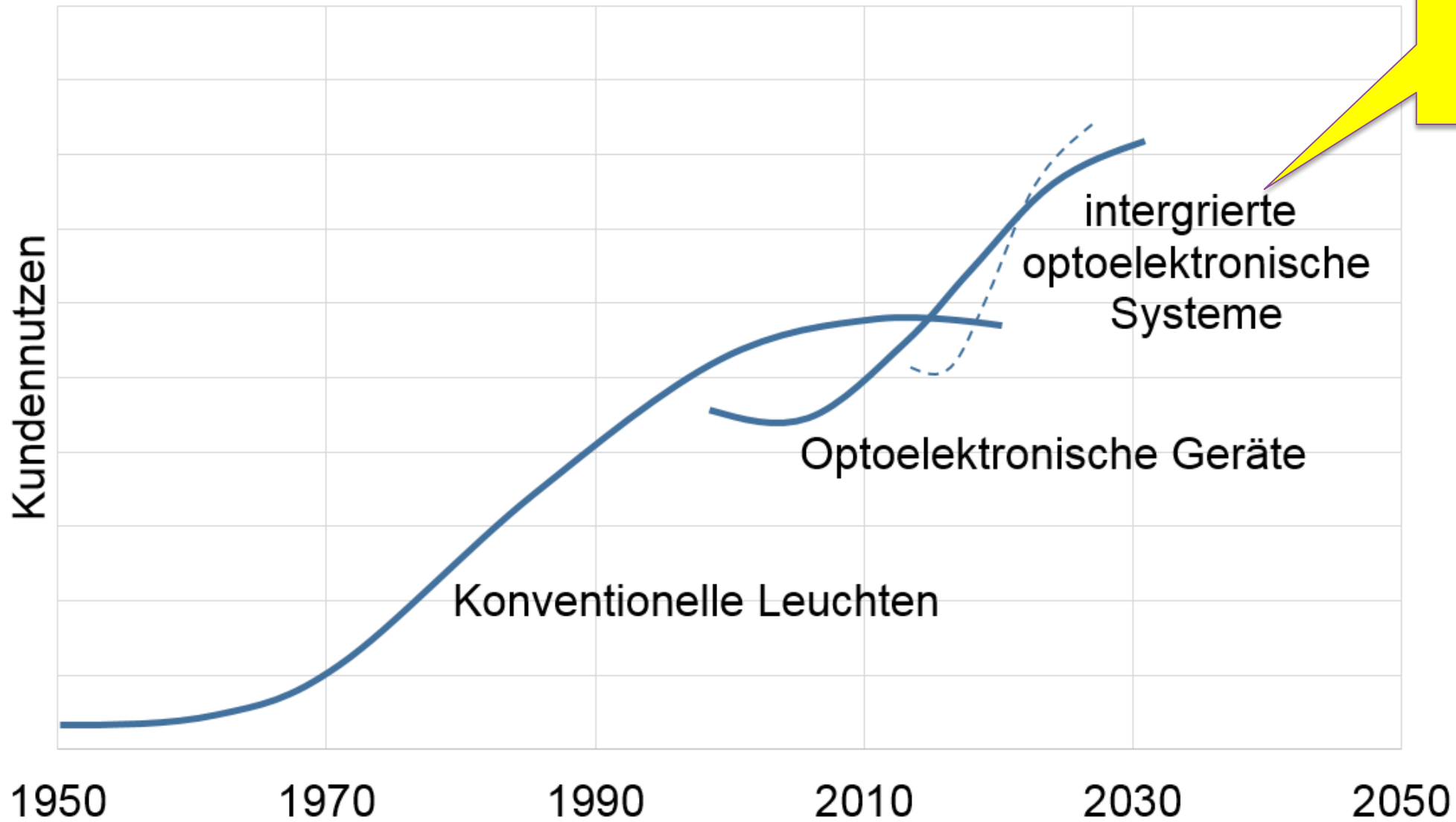
symbol. Lichtverteilung



**GERMAN  
DESIGN  
AWARD  
WINNER  
2017**

# The 3<sup>rd</sup> Wave of Technology Change.

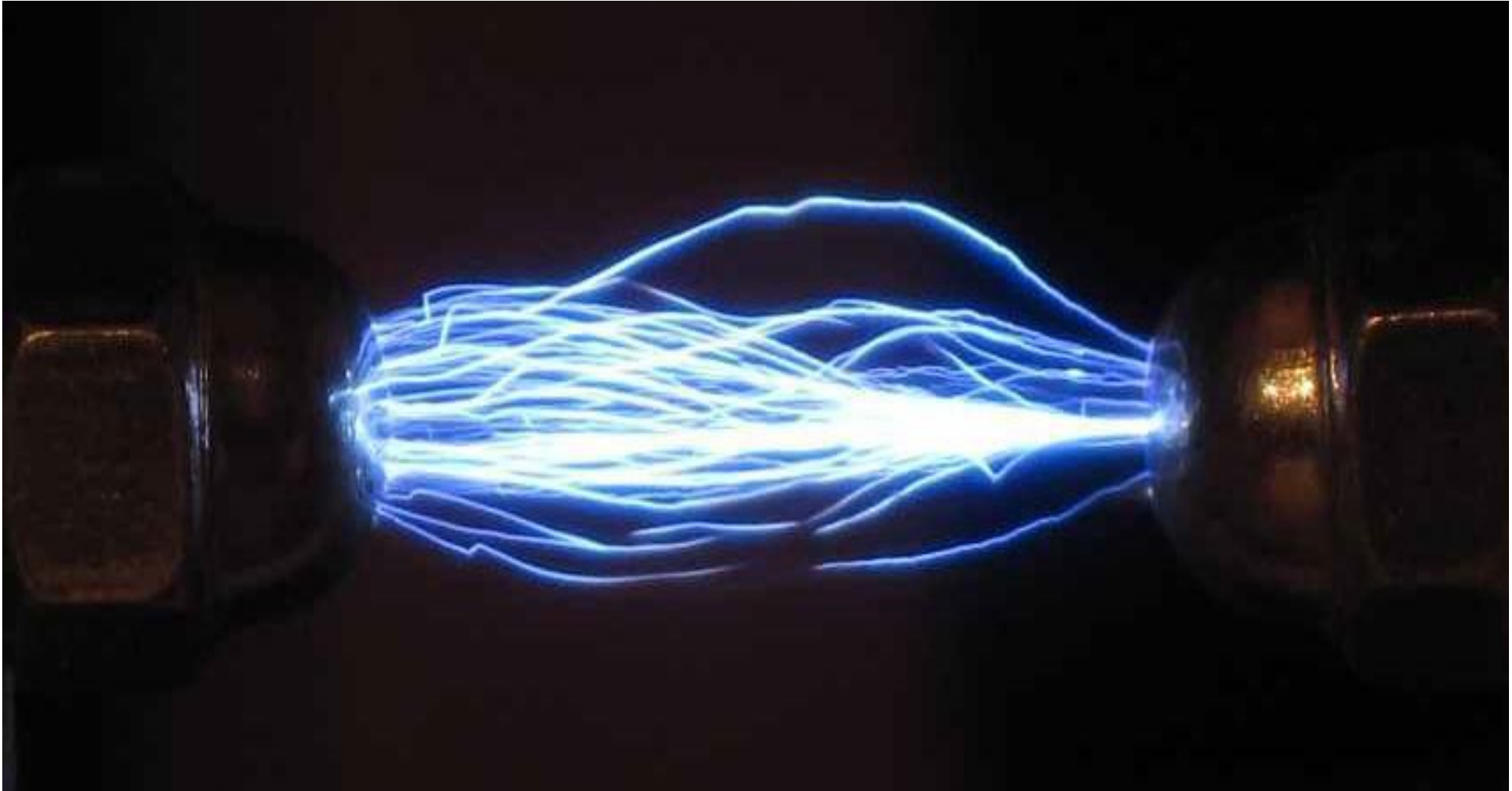
The industry is on the doorstep to apply fully integrated optoelectronic systems.



Lighting, Users and Buildings are fully connected

# Internet of things.

How does this affect the lighting industry?



**1. Light is, where electrical power is.**



# Internet of things.

How does this affect the lighting industry?



## 2. Lighting is infrastructure for in- and outdoor.

# Internet of things.

How does this affect the lighting industry?



50bn  
Light Points  
worldwide

7.3bn  
Smartphones  
worldwide

1bn  
Cars  
worldwide

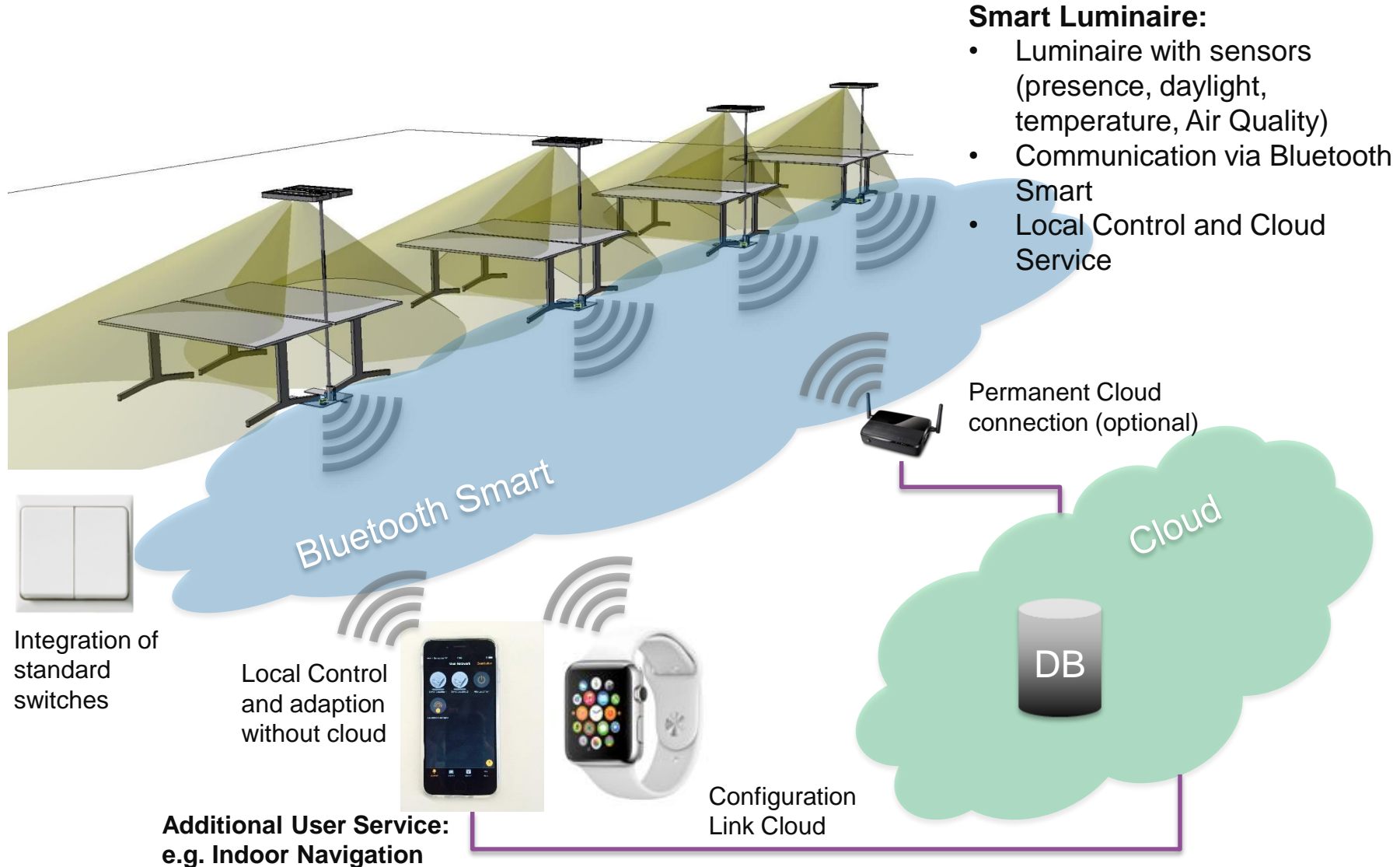
Lighting will be the backbone of the Internet of things.

Light is there, where humans are.



# Smart, Connected Lighting.

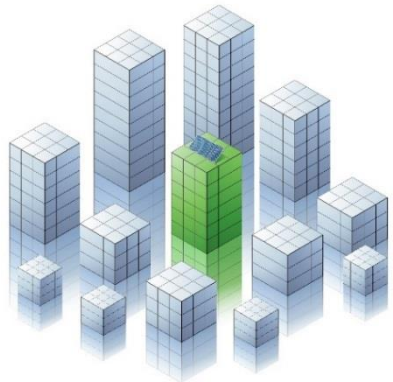
## Use Case Office – Occupancy Mapping.



# Smart, Connected Lighting. Services and benefits.

## Light Hub

- **Monitoring complete building occupancy**
- Identification of buildings
- Live view on app for employees about desk availability
- Luminaire and sensor information are provided and visible on smartphones via cloud service
- Integration in existing information systems
- **Cost and energy saving due to desk optimization**
- **Up to 50% saving in office spaces**
- **Easy failure detection of luminaires**



# Office Worksspace Utilisation.

A Holistic Approach to Optimise the Utilisation of Ressources.

## 1. Provide Concise Data to Decision Makers

do we have to expand our facility or can we reduce the workspace

## 2. Provide Data about Free Space to Approaching Employees

I can book my workspace in the officie while I pick up my luggage at the airport

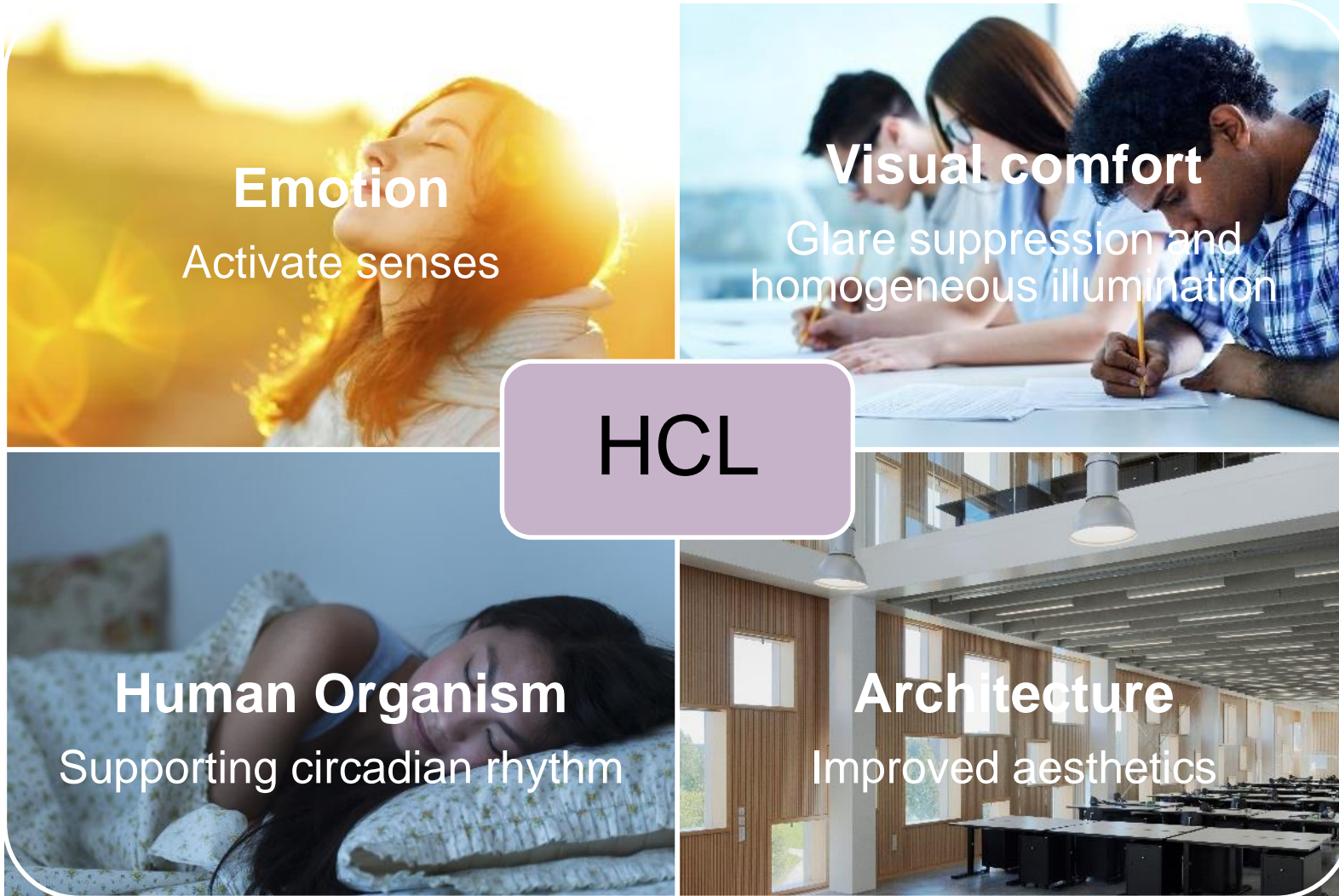
## 3. Provide Data to the Building and Create a Forecast

The expected Occupancy for tomorrow is xx%, allows to adjust the heating/cooling and allows to order the power consumption for the next day



«Lighting, Users  
and Buildings are  
Fully Connected»

# Our Holistic view on Human Centric Lighting. Impact.



# Human Centric Lighting.

We Care About the Impact of Light on Humans



«Finally, it Is About  
Us»

# Thank You