Smart, Connected Lighting

Christian Hochfilzer
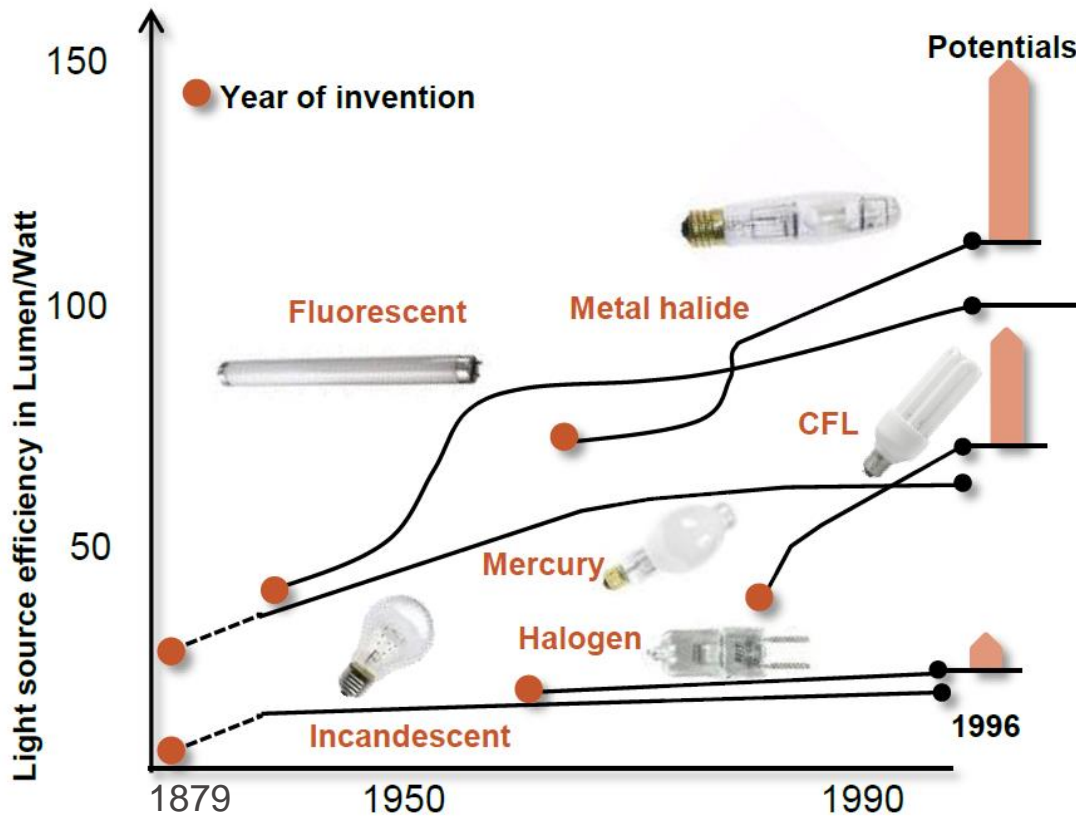30.10.2015

Swissphotonics
EPFL, Lausanne

The Heritage of our Industry.
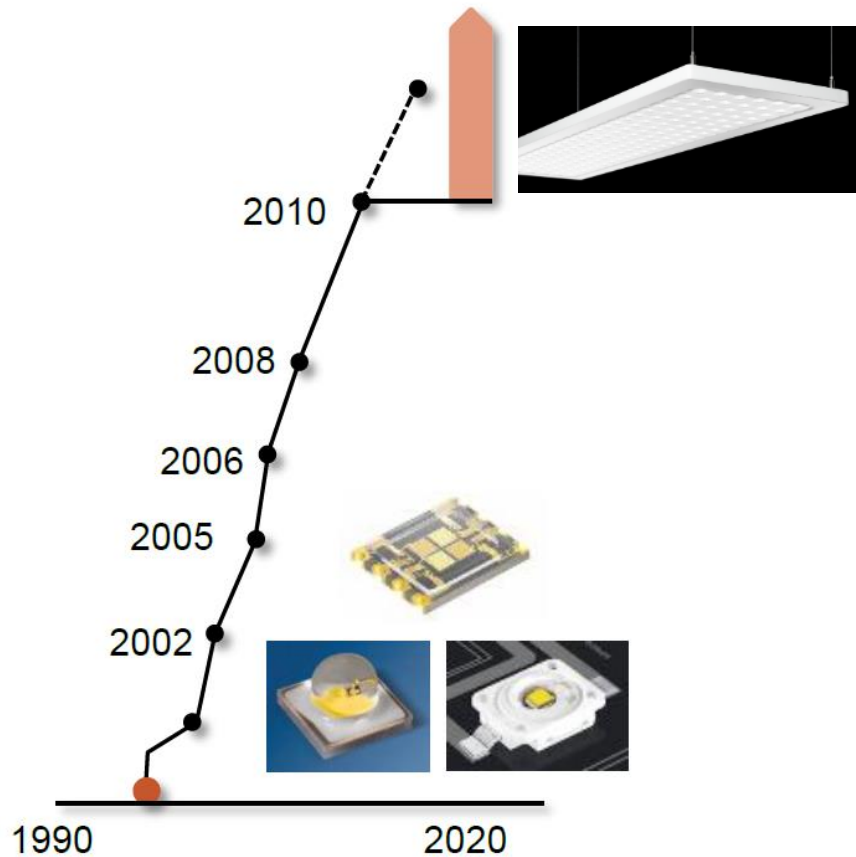## Conventional Light Sources.

- Industry with moderate innovation cycles (incandescent bulb lasts for more than 100 years)

- Stable and well understood competition

- Fragmented industry with local coompanies

The New Millennium.

In the Light of Radical Change.

Solid State Lighting

- 2002: white LED products emerge

- 2010: strong market penetration in professional lighting

- Enhanced market dynamic and competition

- 2014: Point of no return
  LED penetration >> 50%

- Today LEDification is replaced by differentiation

- A truly solid state light source opens the field to digital and smart, connected lighting

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Smart, Connected Lighting
More than Light…

Light is design.	Light is Life.	Light is flexibel	Light is better work.
Light is branding.	Light is intelligent.	Light is health.	Light is efficiency.
Light is creativity.	Light is emotion.	Light is security.	Light is touching.

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Internet of things
Hyper-Connectivity

2.5 billion
Connected **people** on social networks by 2020

75 billion
Connected **devices** by 2020

"The Internet of Things"

$65 trillion
Global **business** trade by 2020

Illumination / Light: 5-10% of all connected things in 2020
(Gartner research data)

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Internet of things

Will have an impact on all aspects of our business and life.

- Responsive supply chains
- Predictive maintenance
- Connected home
- Connected cities
- Connected asset management
- Connected logistics
- Connected car
- Connected healthcare
- Connected retail
- Connected buildings
- Connected family
- Connected policing

◯ in the scope of professional lighting.

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Internet of things
Data is the oil of the 21st century.

Exabytes per Month

61% CAGR 2013-2018

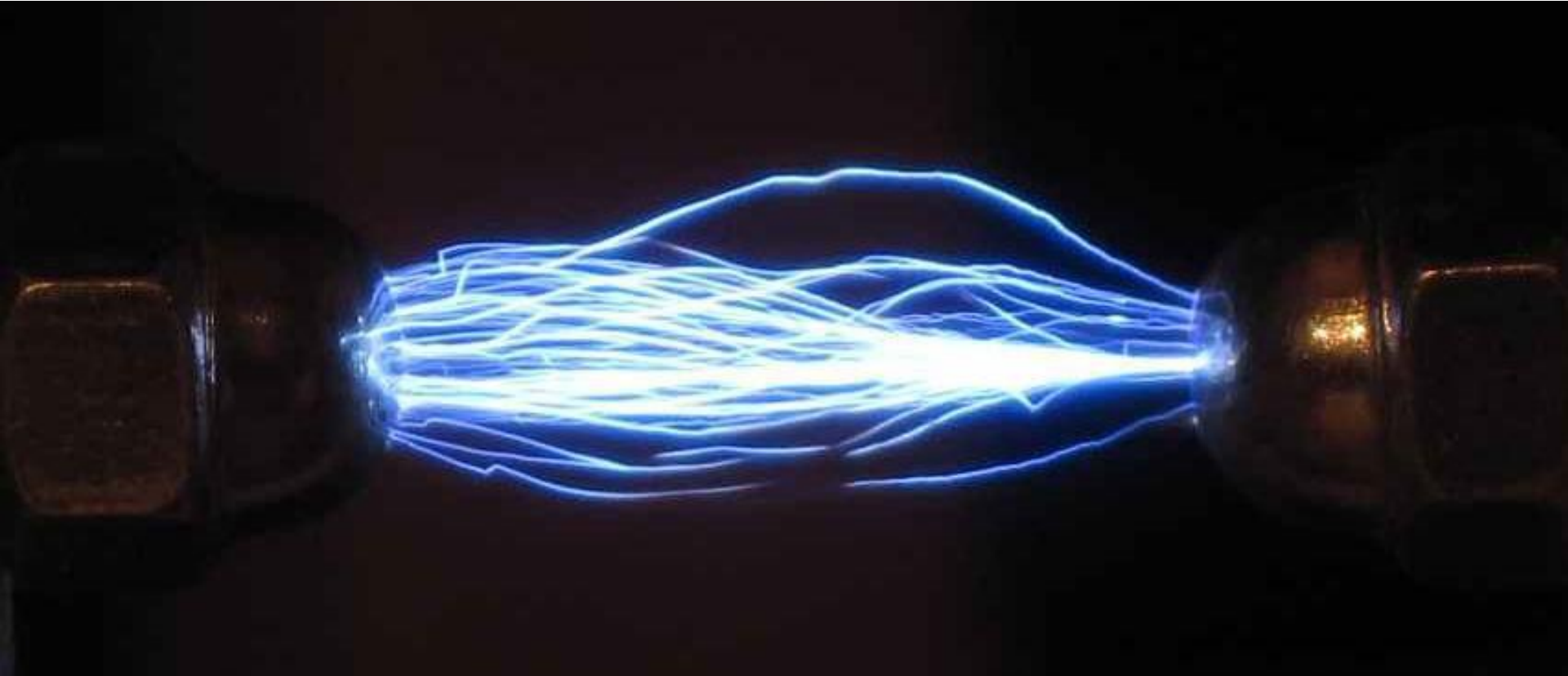|					
1.5 EB	2.6 EB	4.4 EB	7.0 EB	10.8 EB	15.9 EB
2013	2014	2015	2016	2017	2018
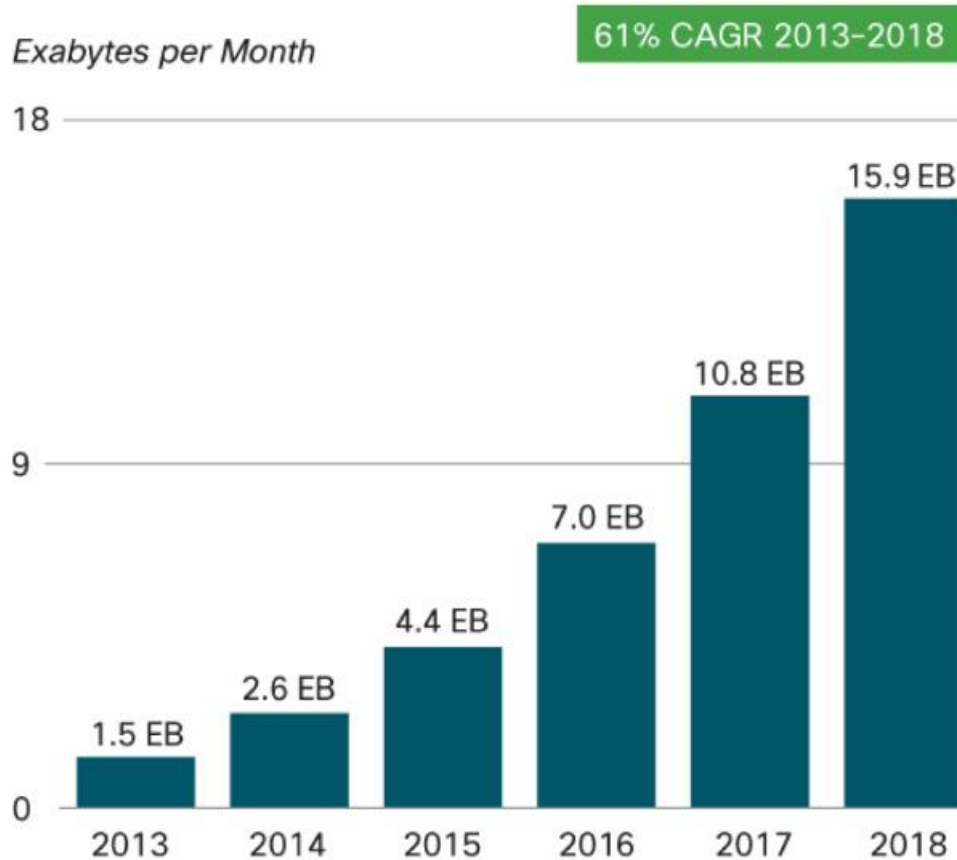
Source: Cisco VNI Mobile, 2014

Exponential Data Growth

- System Monitoring,
- Controls
- Industry 4.0 in Germany
- Big data, example 360° Customer view

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Internet of things
How is that linked to professional lighting?

Light is where electricity is.

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Internet of things
How is that linked to professional lighting?

Light is omnipresent.

Internet of things

How is that linked to professional lighting?

Light is outside and inside.

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Internet of things

How is that linked to professional lighting?

Light is where we are.

Professional Lighting is a backbone for the Internet of things

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Smart, Connected Lighting
What are the benefits?

Focus on lower Total Costs of Ownership	Added Value in the Application
The luminaire becomes an actuator	Improved market value e.g. LEED
	Enhanced productivity e.g. control of air quality or adaptive lighting
e.g. Occupancy improvement of buildings	Recreation based on biodynamic illumination
	Innovative, green Image
e.g. improved CO2 emission	Personalised Control Options for the User

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Smart, Connected Lighting

Transition towards products with higher integration

Traditional Industry Model

- Low integration
- High costs
- No interaction (exchange of information or data)
- Compromise in reliability and performance

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Smart, Connected Lighting
Integration

Luminaires with integrated sensors and controls.
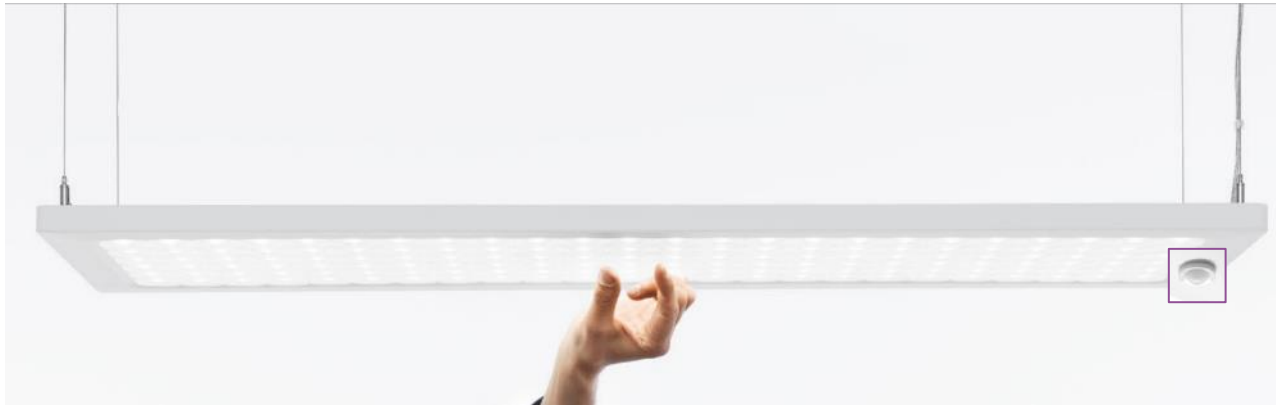
- Optimized cost
 - Hardware, Design and Installation
- High Reliability and Performance

- Trend: From Hardware to Software based controls
  - → e.g. "Real Time" controls based on external factors like cost for electricity

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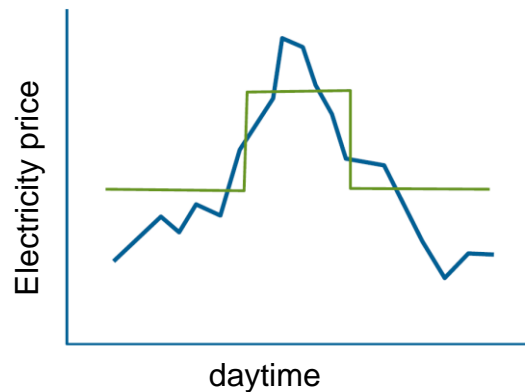
Smart, Connected Lighting
Integration

Luminaires with integrated sensors and controls AND permanent connection to IoT.

Sensors for diagnostic functions: Power
Measurement, Temperature Measurement, Presence,
run time measurement, etc.

Integration
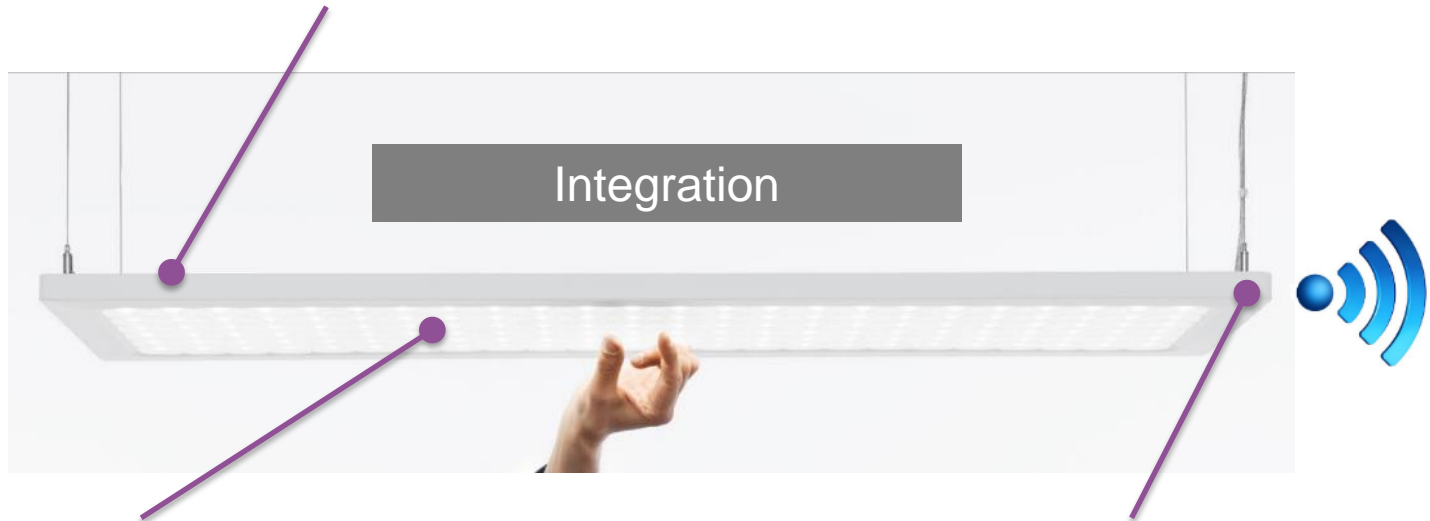
Intelligent Light shaping:
e.g. high vertical illumination due to
patented Square Optics

Communication:
Wireless
VLC – Visual Light Communication
iBeacon for Indoor Navigation
Local / configuration and controls

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Smart, Connected Lighting
Technology Architecture – Mesh Network
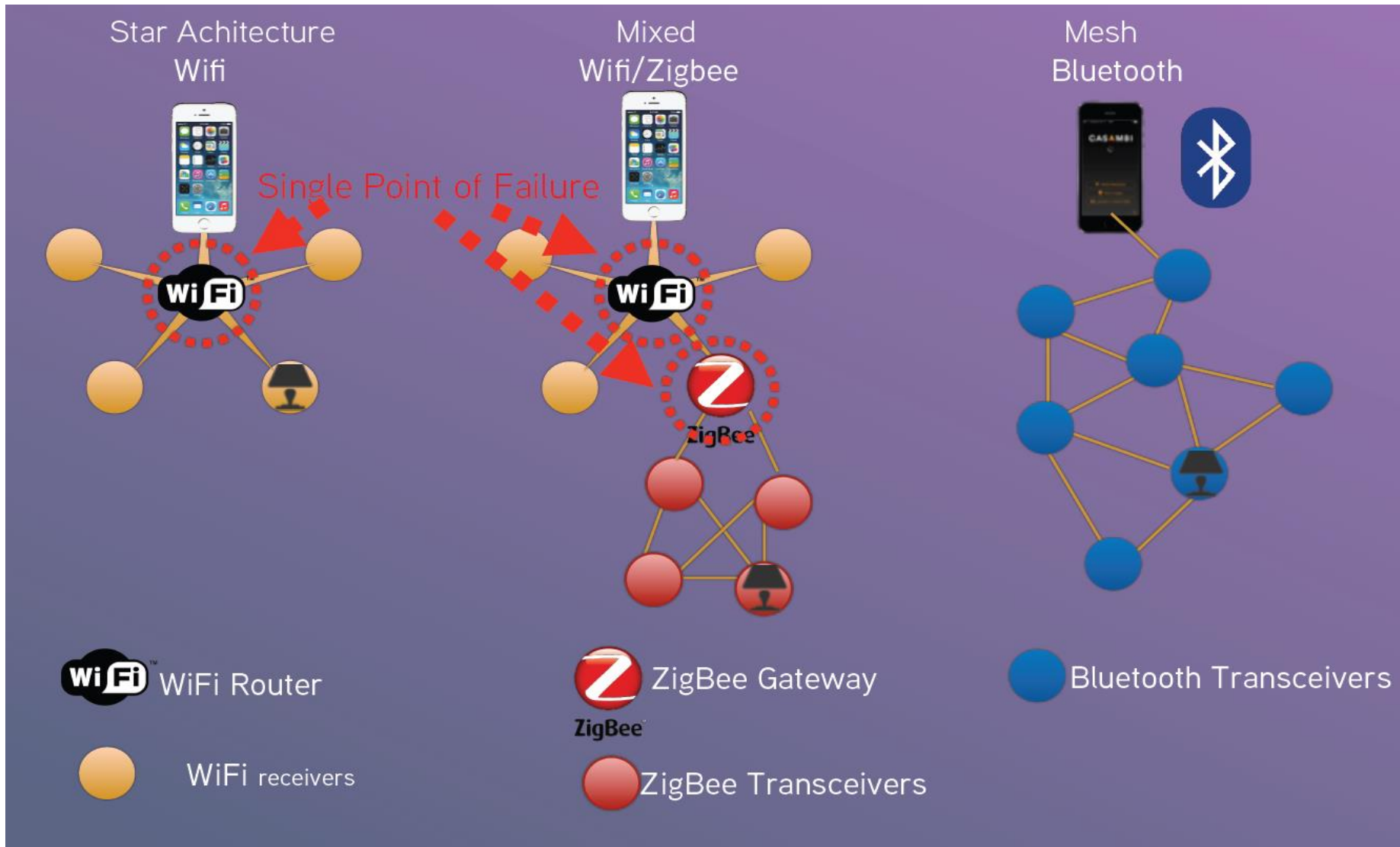
Smart, Connected Lighting
Visual Light Communication

- Indoor Navigation
    - The customer is guided or navigated
    - Shop owner collects data that help to improve the service
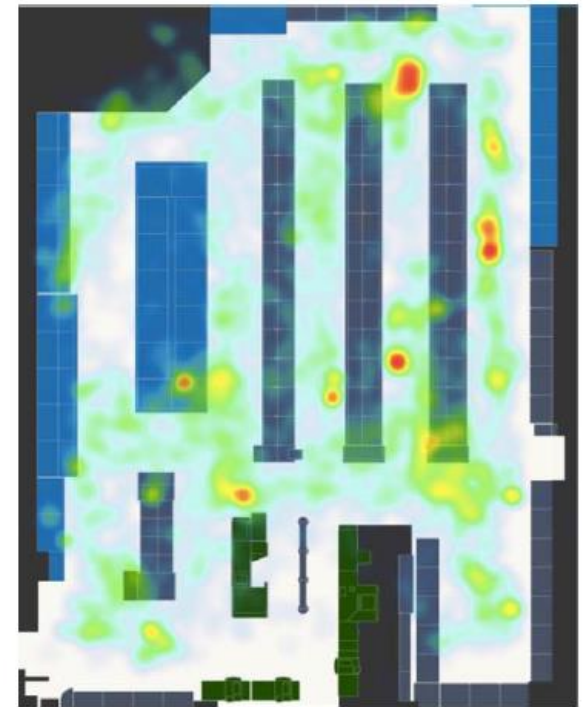
Location Analytics

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Smart, Connected Lighting
In the Open Space Office: ALONEatWORK®

All Luminaires ON
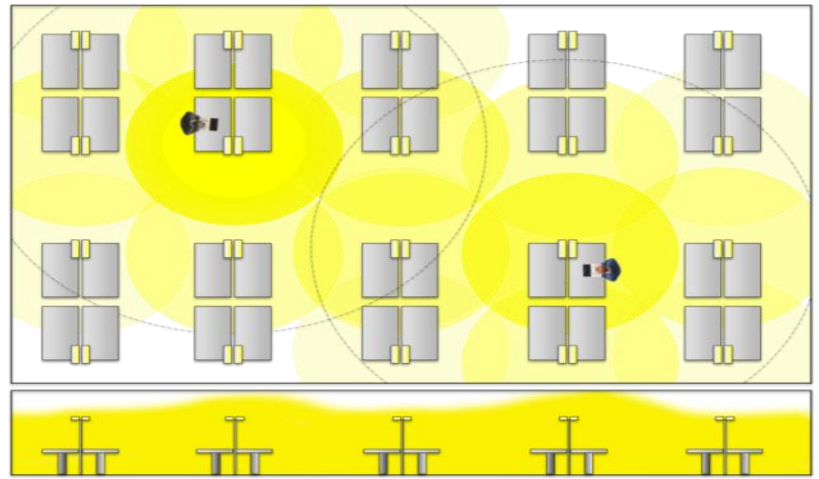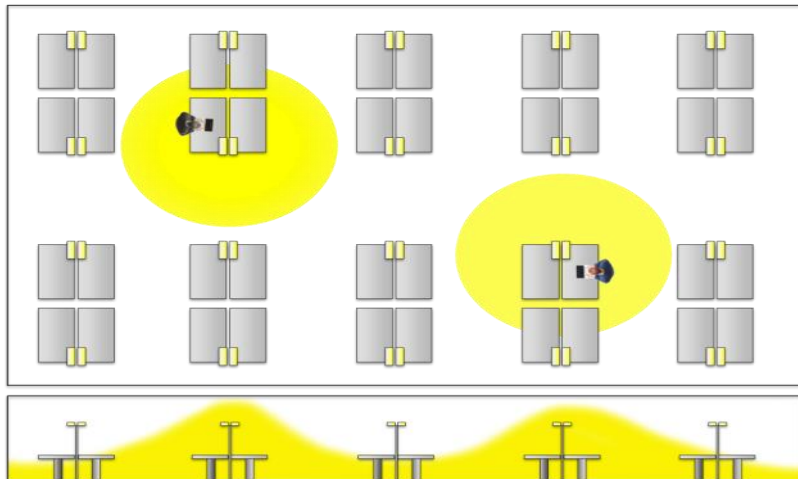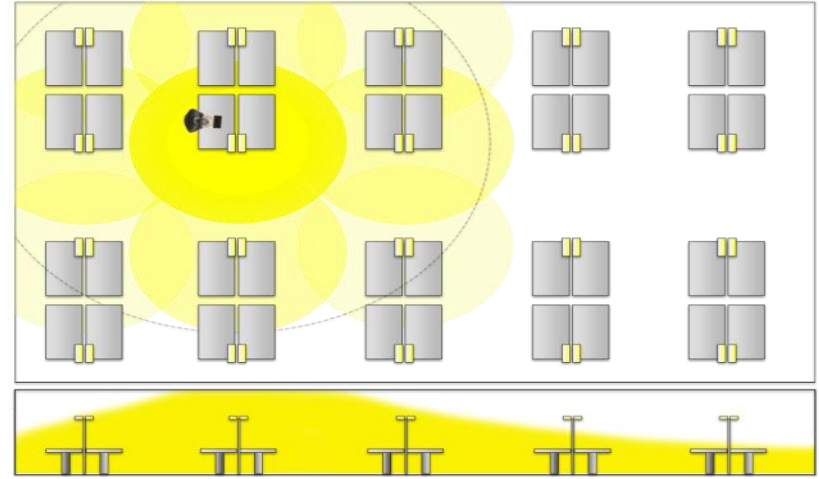
All Luminaires OFF

ALONEatWORK®
(swarm function)

ALONEatWORK®

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ALONEatWORK®
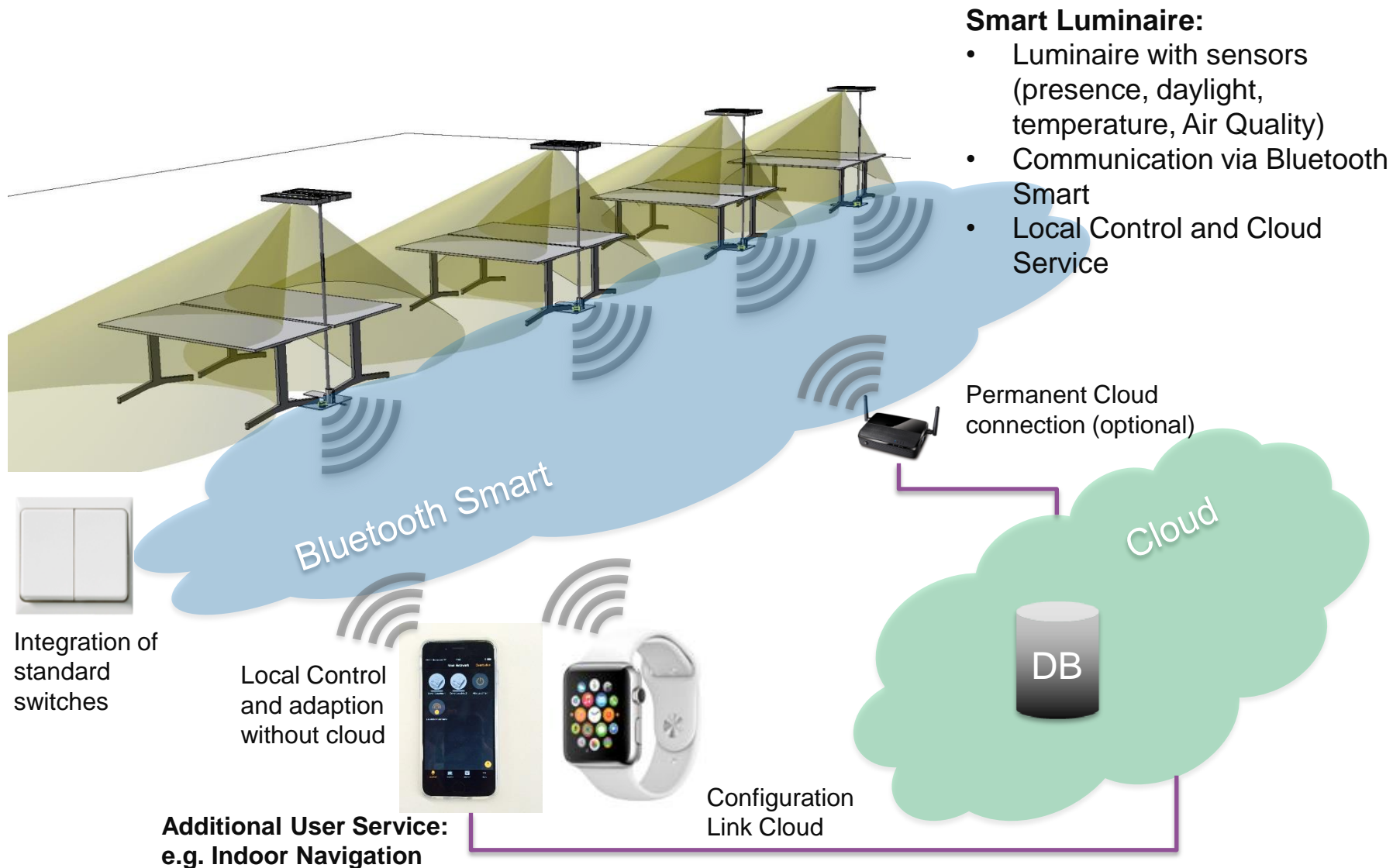
The solution with auto setup (no configuration).

Light island
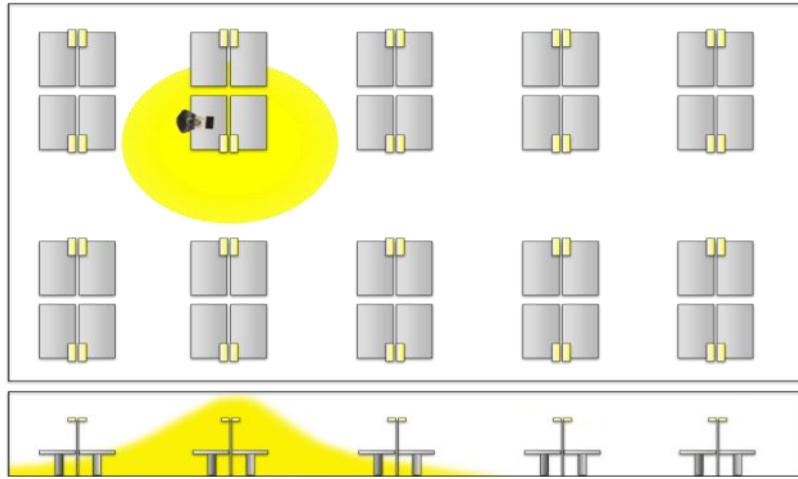
Light Cloud with ALONEatWORK

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Smart, Connected Lighting
Use Case Office – Occupancy Mapping

Smart Luminaire:
- Luminaire with sensors (presence, daylight, temperature, Air Quality)
- Communication via Bluetooth Smart
- Local Control and Cloud Service

Bluetooth Smart

Permanent Cloud connection (optional)

Cloud

DB

Integration of standard switches

Local Control and adaption without cloud

Configuration Link Cloud

Additional User Service: e.g. Indoor Navigation

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Smart, Connected Lighting
Optimising Total Cost of Ownership

Benefits

- Resource Optimized **Building** and **workspace** Usage
- Dashboard for building utilization, energy consumption, expected lifetime, failure detection and maintenance prediction
- Providing Data for Building Management system
- Configuration of luminaires: Brightness, follow up time, Addressing
- Lokal User Control (if needed) with mobile devices e.g. smartphone, tablet etc.
- Light as a service

Energy Usage Map

Average Daily Energy Usage (30 day average)

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Smart, Connected Lighting

Value Added

- Improved productivity thanks to improved light quality
- Faster Recovering with bio dynamic light
- Circadian light (human clock)
- Human Being requires adapted and individual light based on personal characteristic and task to fulfil
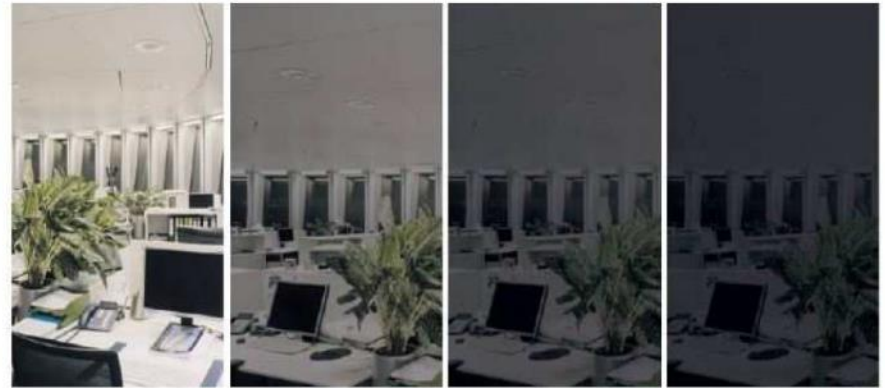
Colour Perception   Brightness Perception

A different view …

Individual conditions require adapted lighting situation.

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Regent Mylights™

One Answer. Light as you want.

- Mylights™finder offers the opportunity to recognize the preferred lighting configuration
- local and automated detection via Smartphone
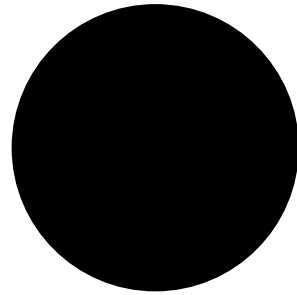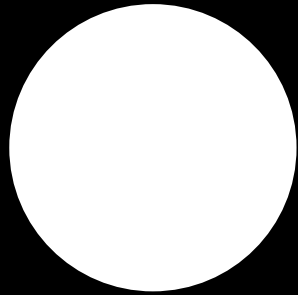
Merci Bien

Regent Lighting

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