

Case studies intelligente verlichting

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XICATO

LED EVENT 2017

Design en engineering trends voor LED-applicaties

BE **WOENSDAG 29 NOVEMBER 2017**
TECHNOPOLIS, MECHELEN

NL **DONDERDAG 30 NOVEMBER 2017**
CONGRESCENTRUM 1931
BRABANTHALLEN, DEN BOSCH

Intelligent Lighting in Theory and Practice

A Starting Point

Communication: Overview

In Action

Case Studies



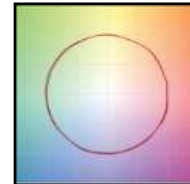
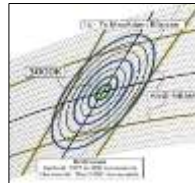
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A Starting Point

Starting Point: Light Quality

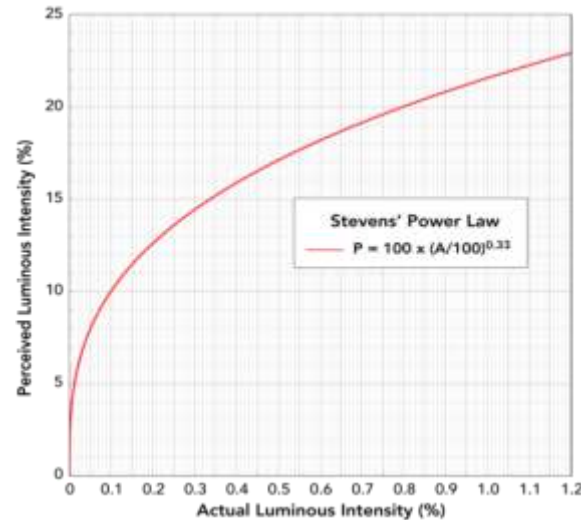


Consistency over long time

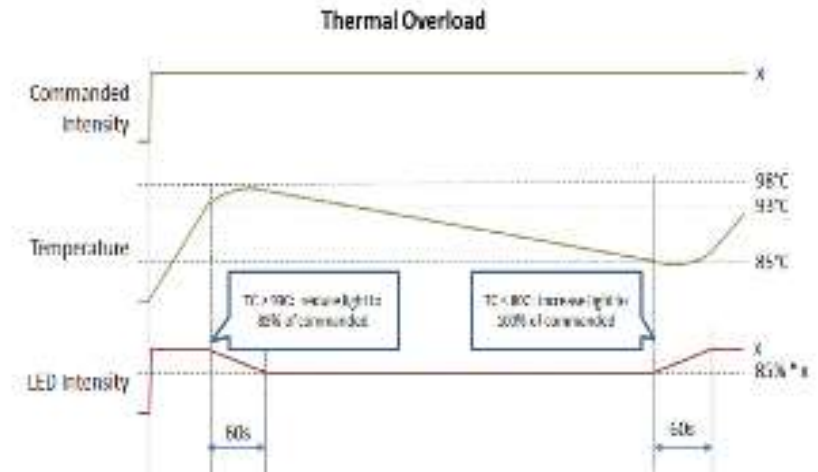


Accurate colour representation

Starting Point: Integrating Electronics



Deep dimming (0.1% DALI)



Diagnostic sensors and auto correction

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Communication: Overview

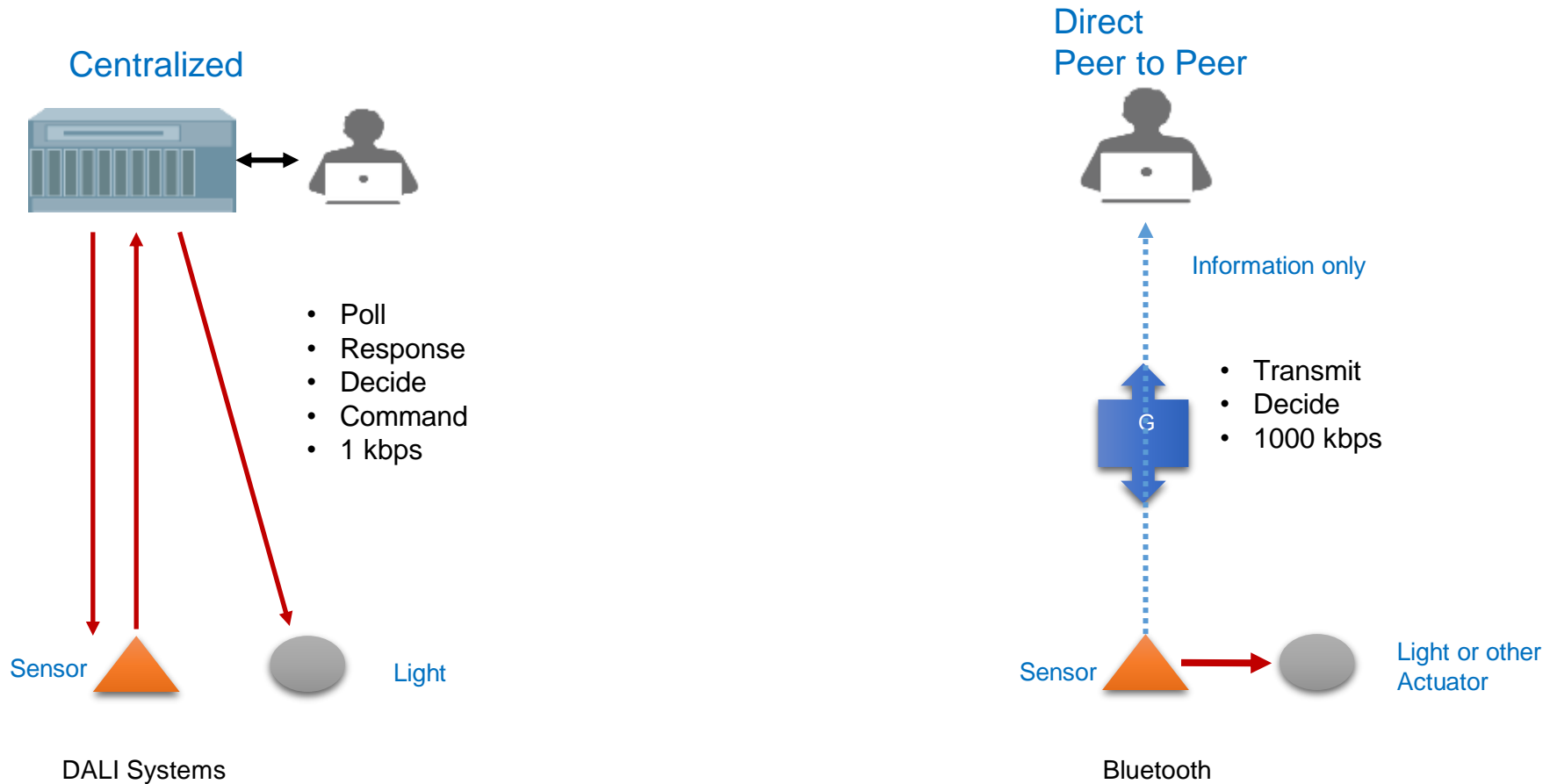
Connectivity



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All devices communicate.
Goal: automatic optimisation of the
experiences of the people within a building
and minimising energy consumption.

Architecture is Important for Performance



Smart Buildings: key to success is one industry wide open protocol. Why Bluetooth?

- Covers all the OSI (Open System Interconnection) layers. (Open and license free) C/W IEEE 802.15.4
- Bluetooth LE designed for battery powered / energy harvesting devices, eg sensors. Best radio of all low-power, low-bandwidth communication standards. Scaling!
 - *fastest, 1Mbit/s*
 - *low overhead*
 - *adaptive frequency hopping*
 - *most energy efficient => long battery lives*
 - *open air range with amplifier ~ 400 – 500 m*

Reliability, latency

Practical usage
- Ubiquitous availability in (mobile) devices
 - *low cost (ultra high production volume)*
 - *development – tool support and infrastructure*
- Delivery of entirely new functions

Application

Presentation

Session

Transport

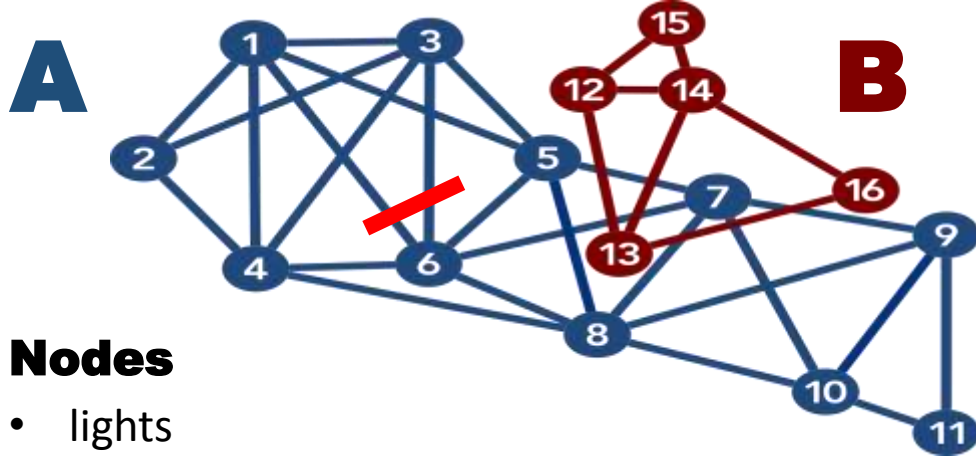
Network

Data Link

physical



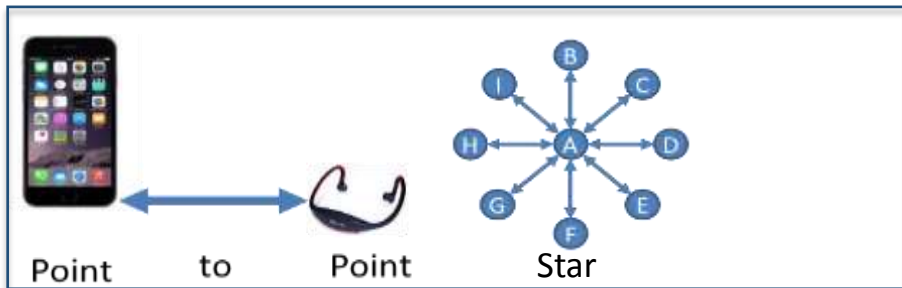
Bluetooth, BLE, Mesh



Nodes

- lights
- sensors
- switches
- blinds
- ...

- Point to point, star topology, mesh
- Bluetooth mesh and commercial lighting
 - Interoperability
 - All OSI layers
 - Scale
 - Many to many
 - Scalable to thousands of nodes / groups / scenes
 - Robustness
 - Speed / channel hopping / repeats
 - Multi-cast, multi-path
 - Self-healing
 - Complex layouts
 - Lack of central controller



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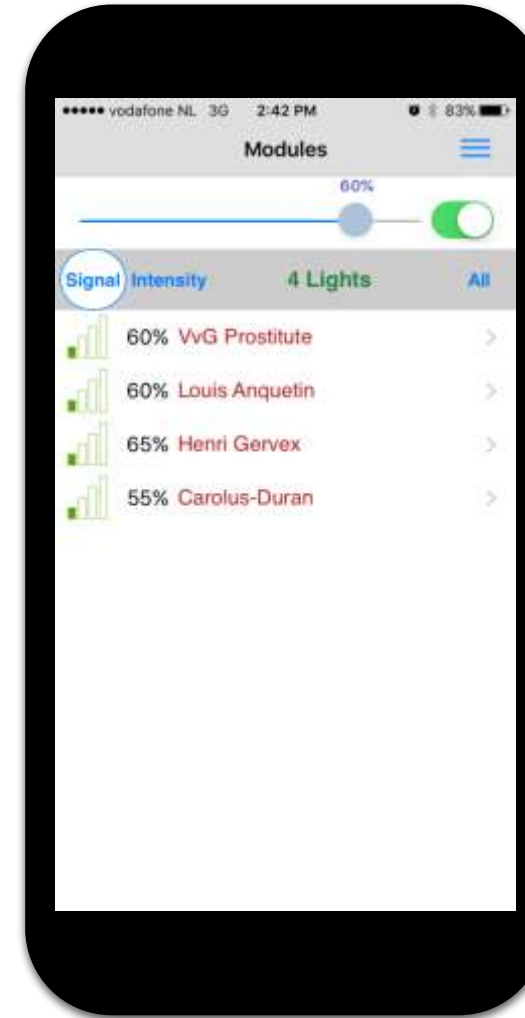
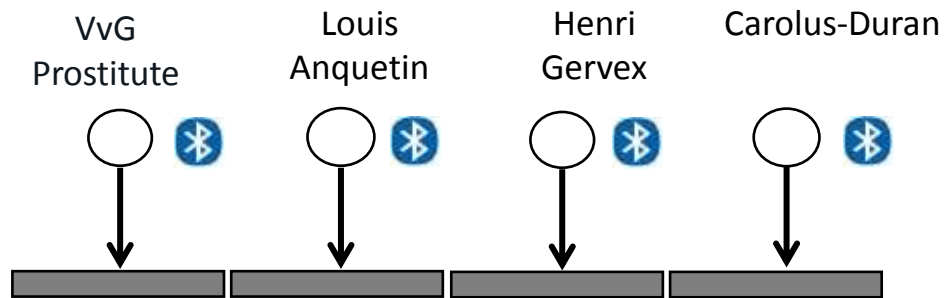
In Action

Switches

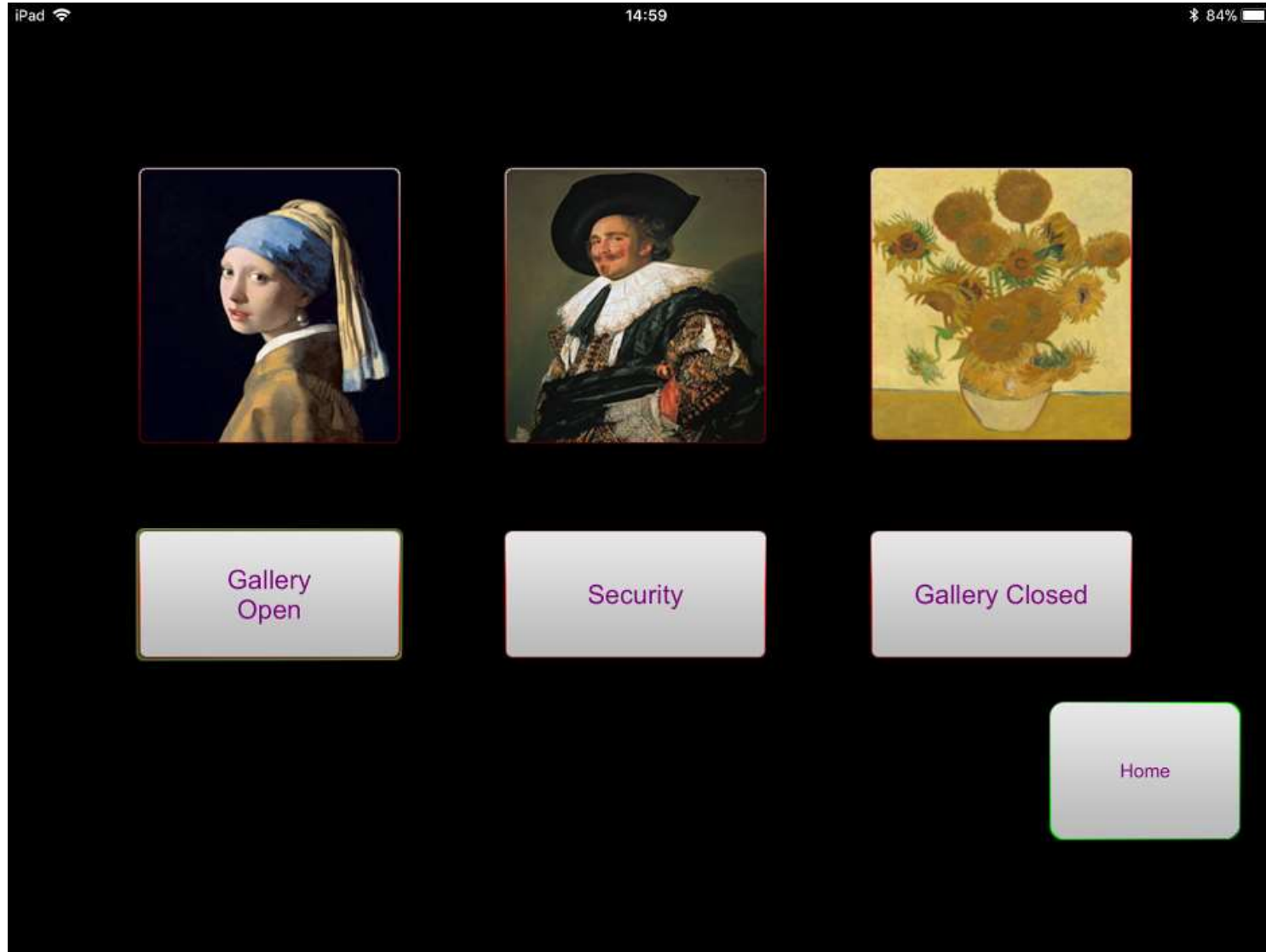


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Apps



Scene Recall through App



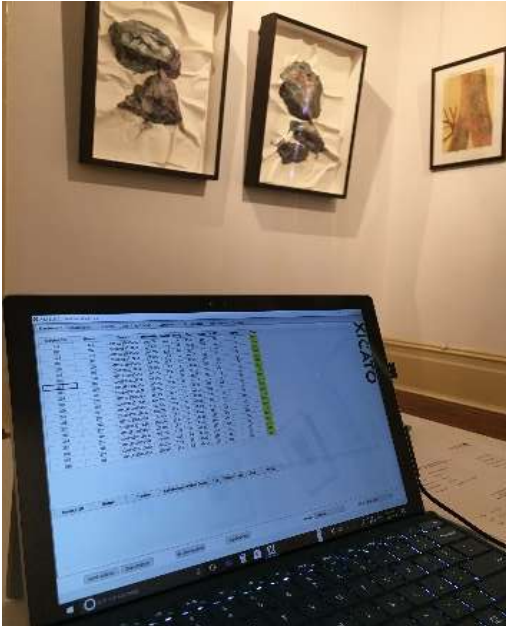
Sensors



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Control Panel for Detailed Provisioning



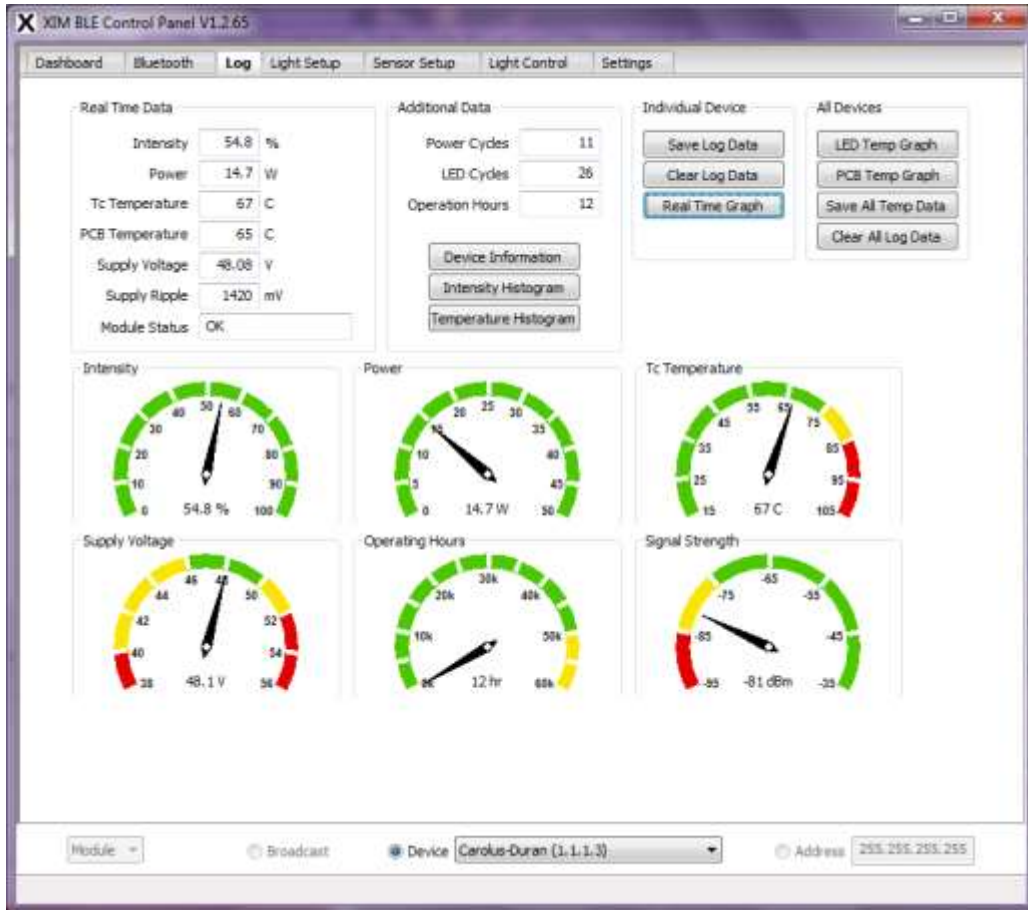
Group/Scene Management

BRAEMAR GALLERY (1)	Mode	Group
ABERDEEN ROOM (2)	Number	1
BALMORAL ROOM (3)		
CRATHIE ROOM (4)		
SECURITY (5)		
CLEANING (6)		

Buttons: Add, Modify, Remove, Import ..., Export ..., Move Up, Move Down

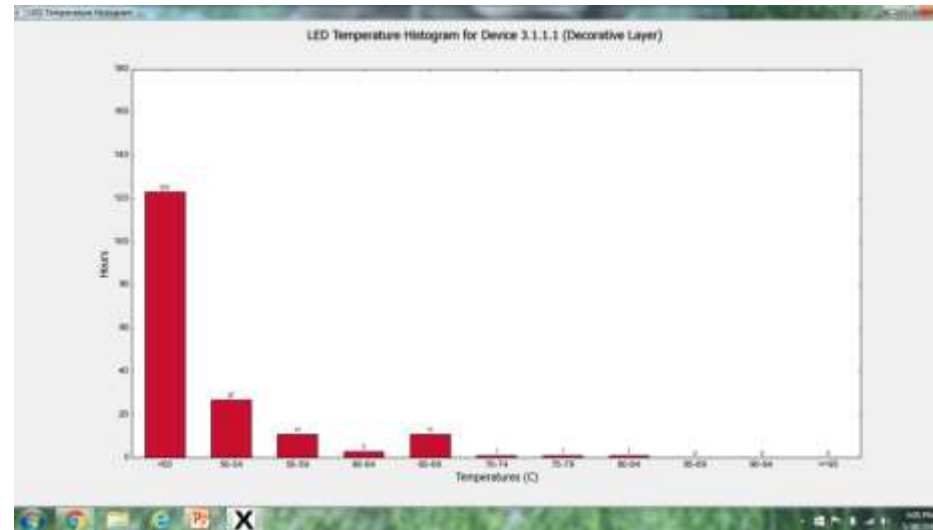
- See and name lights
- Create lighting groups and scenes
- Program associations between lights, sensors, and switches.
- Probe lights for all available operating data and keep data logs
- Create secure access zones

Information Retrieval



Maintenance savings:

- Real-time status and preventative maintenance. Red and amber alerts
- Historical data optimisation - group replacement cycle



BLE to IP Gateway

Enables remote access BLE networks for provisioning, monitoring, control, management etc



Gateways

Address

10.50.1.62:8000

Modules

10

Change Secure Network

Current Network

Experience Room

Controls Enabled

True

Toggle Control

Remove Gateway

Add Gateway

Tick length in seconds (min, 1s):

Seconds

Current update interval: 5s

Pause Updating

Timeout in milliseconds (max, 30s):

Milliseconds

Current timeout: 5000ms

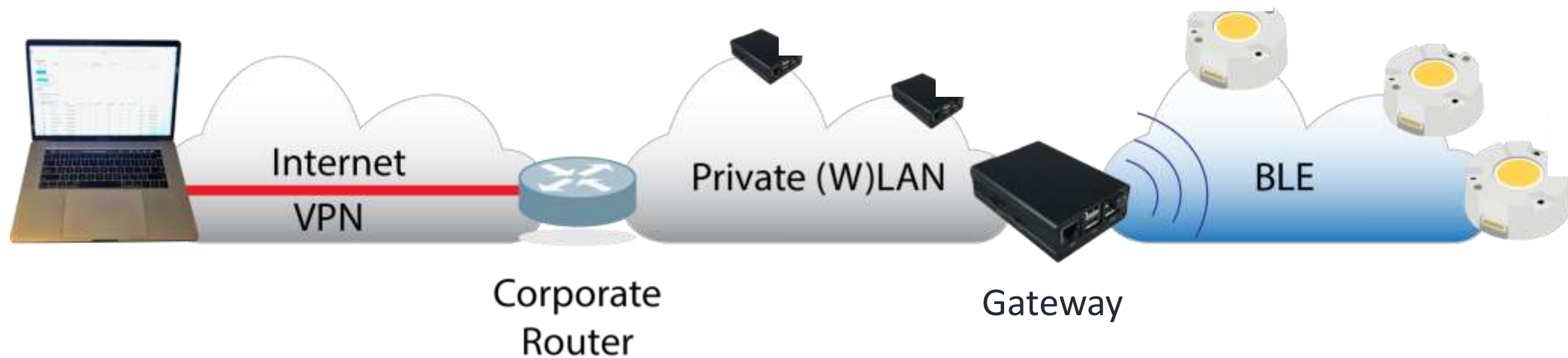
XIMs

On Gateway: 10.50.1.62:8000

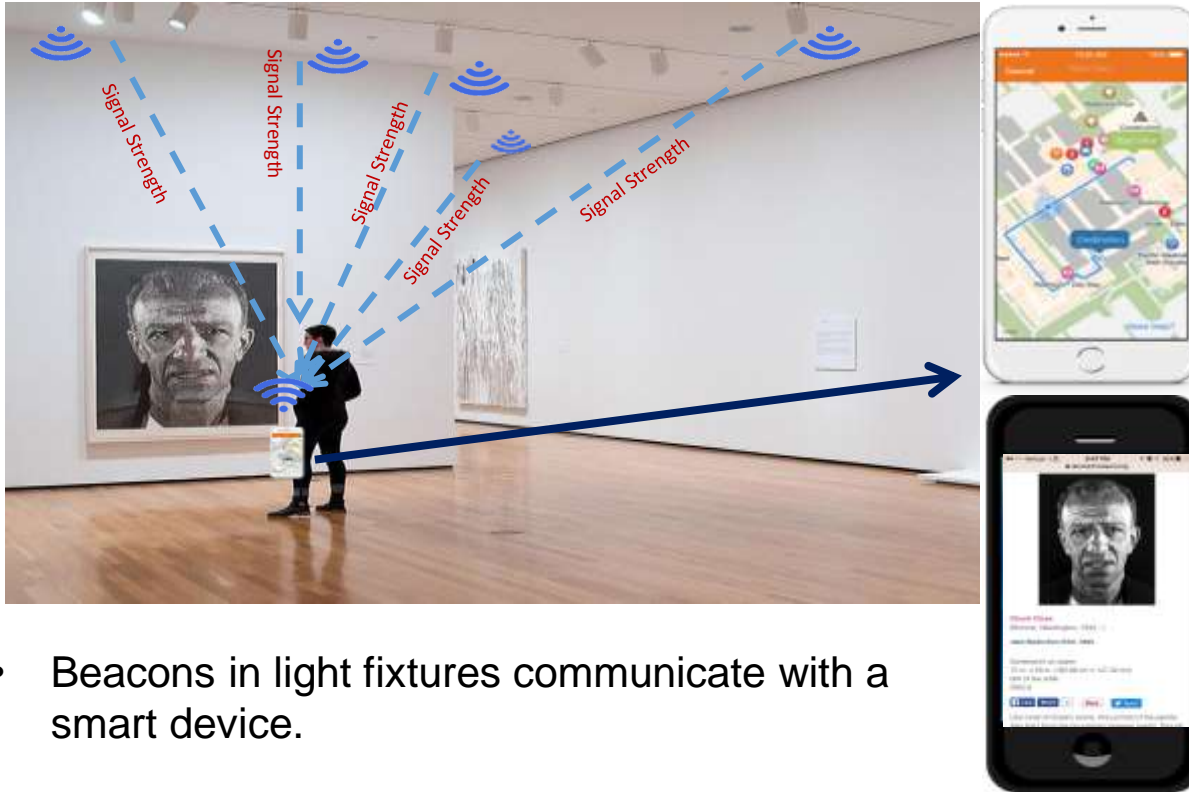
Broadcast Controls

Network: Experience Room (B)

Device ID	Name	Device	Intensity	Power	Tc Temperature	Supply Voltage	On Hours	RSSI	Status
1810	Window A (Front)	XIM19803020A5A	0	0.3	22	48.58	911	-59	<div>Indicate</div> <div>Show Controls</div>
1820	Window B	XIM19803020A5A	0	0.3	22	48.48	878	-63	<div>Indicate</div> <div>Show Controls</div>
1830	Window C	XIM19803020A5A	0	0.3	22	48.42	667	-61	<div>Indicate</div> <div>Show Controls</div>
1840	Window D (Rear)	XIM19803020A5A	0	0.3	22	48.42	837	-61	<div>Indicate</div> <div>Show Controls</div>
1850	Entrance D (Rear)	XIM19803020A5A	0	0.3	22	48.25	746	-69	<div>Indicate</div> <div>Show Controls</div>
1860	Entrance C	XIM19803020A5A	0	0.3	22	48.33	836	-73	<div>Indicate</div> <div>Show Controls</div>
1870	Entrance B	XIM19803020A5A	0	0.3	22	48.45	760	-67	<div>Indicate</div> <div>Show Controls</div>
1880	Entrance A (Front)	XIM19803020A5A	0	0.3	22	48.55	854	-64	<div>Indicate</div> <div>Show Controls</div>



Beacons



- Beacons in light fixtures communicate with a smart device.
- App on the smart device detects unique beacons and received signal strength (RSSI)
- App triangulates location based on RSSI and map embedded in the app. Or location based content

- In the lights: hidden from view.
- Overhead: less interference from objects and bodies.
- Numerous: extremely accurate location of users in the room, and can “instrument” many displays in the space.
- Mains powered: no battery-based constraints on transmission power or frequency.
- Battery-less: eliminate burden of replacing batteries

Case Studies

Case Study: Petrie Museum, London



Lighting Design: ACT Lighting Design
Luminaires: Mike Stoane Lighting
Proximity App: Llama Digital

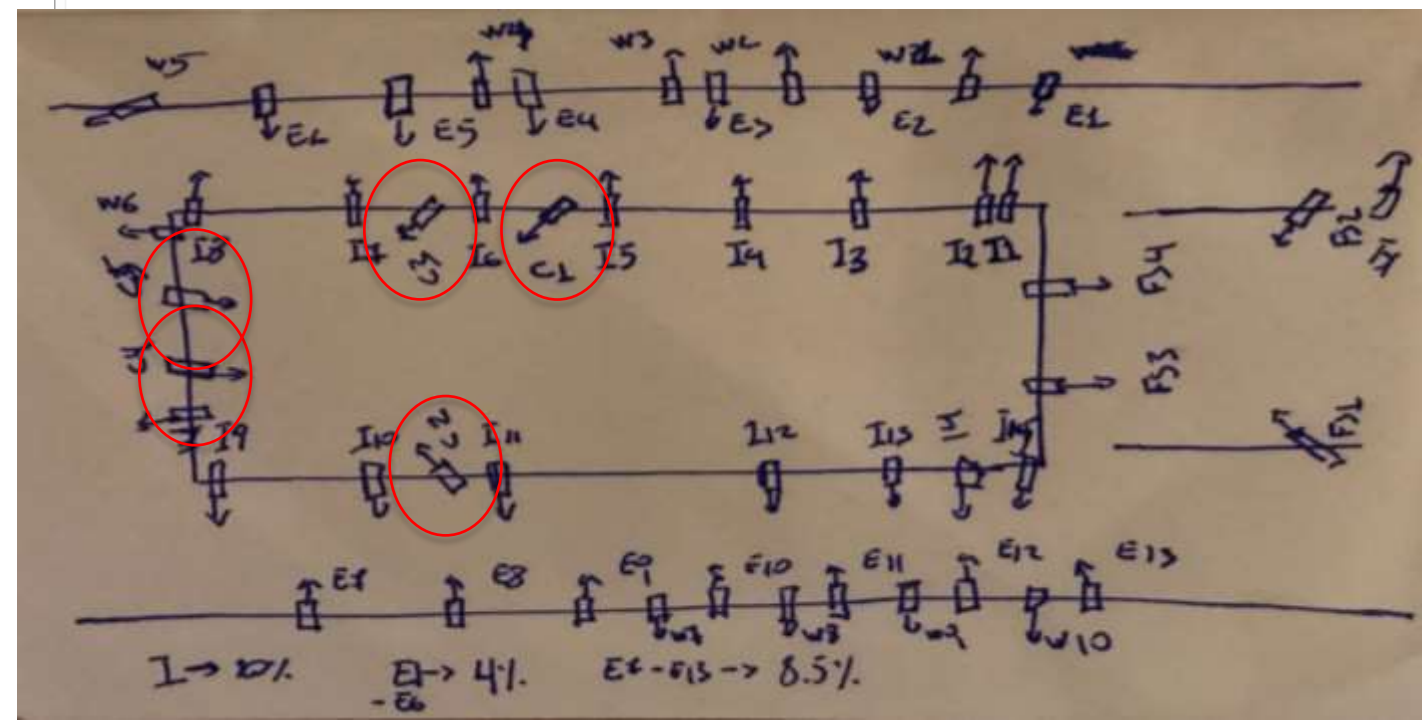
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Dashboard Device Setup Beacons Log Light Setup Groups Scenes Sensors Light Control Settings

Device ID	Name	Device	Intensity	Power	Temp	Vin	Hours	RSSI	Status
1	C1	XIM19953013A6A	0.0%	0.4	25	47.77	1432	-55	NS, SM, OK
2	C2	XIM19953013A6A	0.0%	0.4	26	48.02	1471	-82	NS, SM, OK
3	C3	XIM19953013A6A	0.0%	0.4	26	48.00	1452	-69	NS, SM, OK
4	C4	XIM19953013A6A	0.0%	0.4	33	48.42	1423	-44	NS, SM, OK
5	C5	XIM19953013A6A	0.0%	0.4	33	48.50	4	-48	NS, SM, OK

The Petrie Museum



CP screen shots: grouping, securing, setting max. level and iBeacon

Group Configuration

Devices Not In Group

Devices In Group

>

>>

<

<<

C1 (1)
C2 (2)
C3 (3)
C4 (4)
C5 (5)

Devices Missing Info

☐ Force BLE Read ☐ Auto-Refresh

Group Coffins (5) Get Set Test

☒ Group All Assigned

Secure Network Management

Network Add...

Name

Password

Add Import ... Export ...

iBeacon Configuration

UUID DF96DB9F-46CB-4C1D-AB92-EF169F30EA18

Major 1212 Minor 12

dBm at 1m -45 Tx Power (dBm) 9.5

Period (ms) 1


Get Set

BLE Light Configuration

Light Level Limits

Maximum Level 10.0 %

Minimum Level 0.1 %



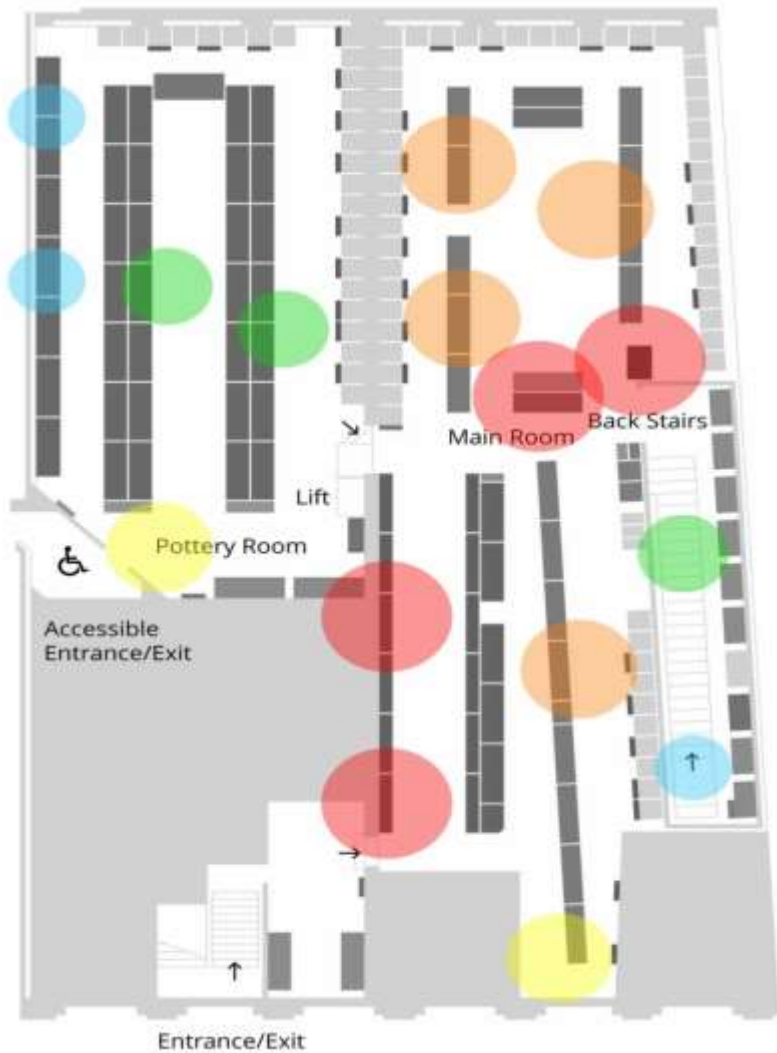
80,000 Objects - where to start?

Provide a way for people to start exploring the museum.



Not this!

Museums: analytics



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Each trigger results in an event being logged to the server

Builds a picture of how people are using the space.

- the most visited / under-utilized parts
- dwell time and visit duration

Make links between visitor numbers and eg events, weather, transport
Informed decision making

Homes: effortless switches



Anyone can install smart lighting anywhere with pre-programmed switches requiring:

- No wires
- No batteries
- No back box

Hotels: easy presets

For area and function

- Areas: reception, lobby, corridor, restaurant, gym, sauna, beauty salons
- Different functions, eg a ballroom used for dance, conference, dinner, casino

For time of day / year / event

- Diurnal changes (daytime / sunset / night) / summer or winter settings / special event like Christmas

Personal guest settings possible: what home means to each guest

Simple configuration on control panel with touch screen interface at front end



Group/Scene Management

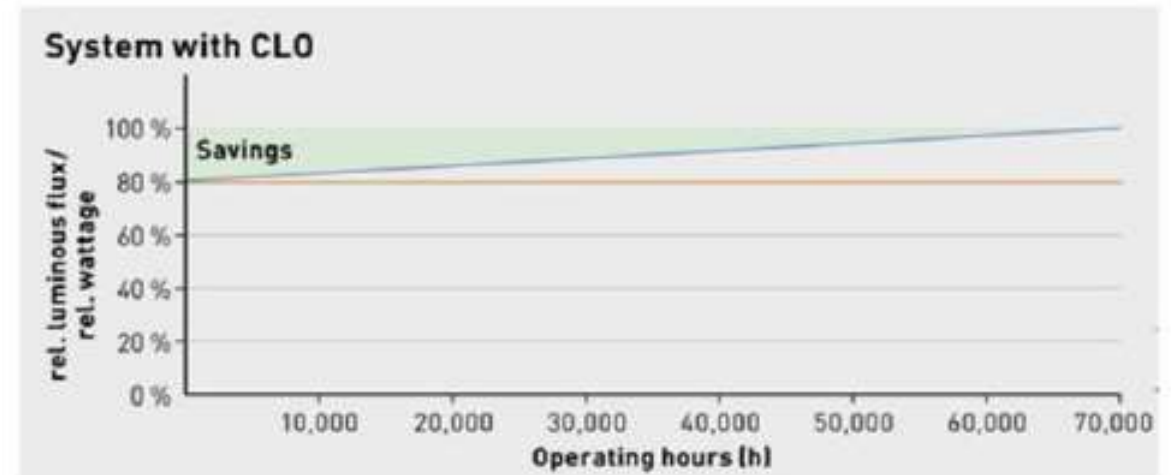
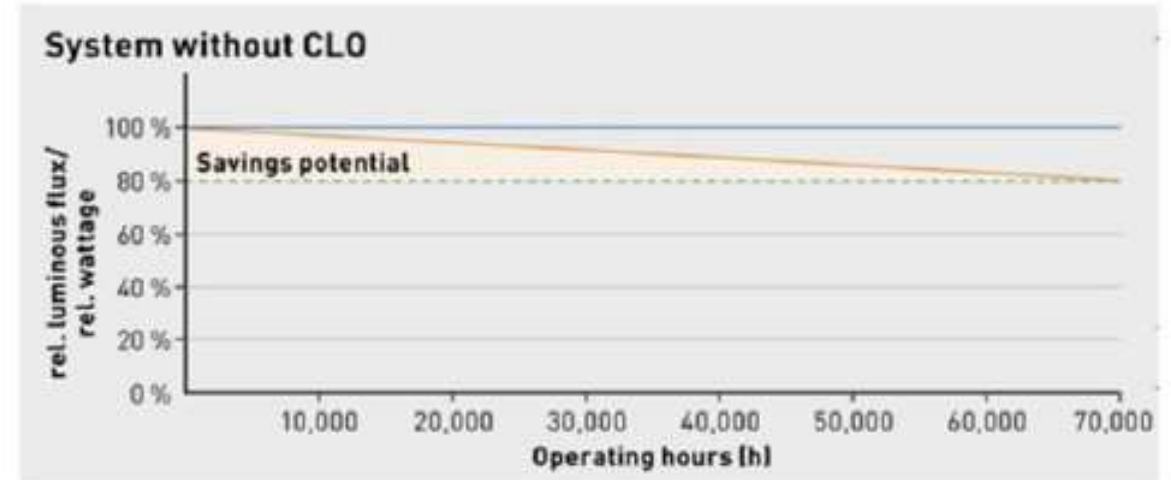
All on (1)	Mode	Scene
All off (2)	Number	6
Conference (3)	Name	
Party (4)		Add
Dining (5)		<input checked="" type="checkbox"/> Show Scene Button Numbers
Evening (6)		

Import ... Export ...

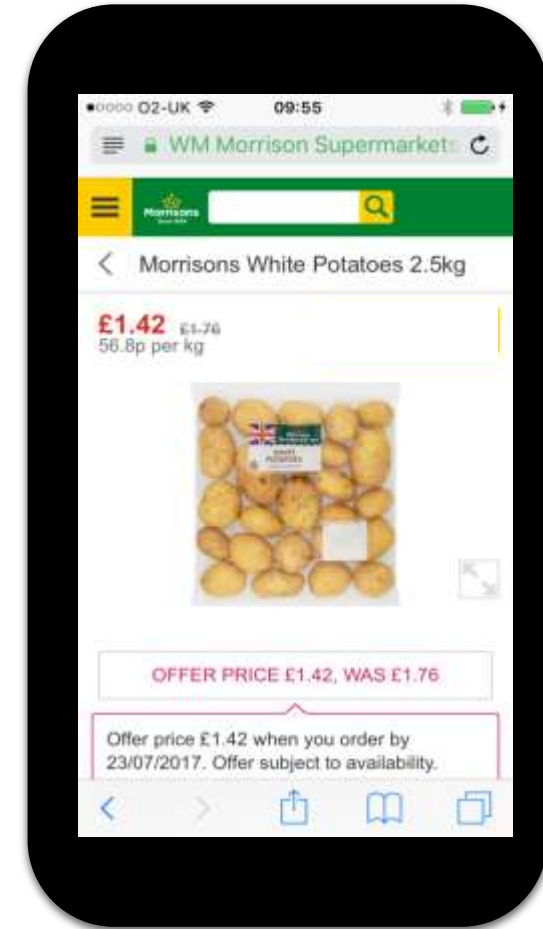
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Offices: Constant Light Output installations

Artificial lighting only used after base level from daylight insufficient



Retail: location based services



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- Wayfinding
- Personalized guidance
- General promotions

Smart lighting testimonials

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Smart Lighting
Tourism, Church, Home, Shop, Office, Bar, Education, Museum

Thank you!



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