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IoT System Architecture of BMS, LMS & BIM

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IoT - More of Everything

- Sensors, data, CPU power, ideas, opportunities, business models and competition

We want controls – but how badly

- Solves Use Cases and Scenarios but not enough market penetration

Controls too pricey?

- Is LEDification ROI good enough?
- Adding IP, PoE, IT is even more expensive

Smart Lighting and Smart Buildings early adoptors

- Ubiquitous sensing, tangible value propositions, better returns on investment

BIM

- Design, estimating, sign-off, operations

Master Systems Integrator

OpenAIS puts IoT into lighting

Design, Install, Commission, Configure

- Simple to understand, flexible topology
- Power, addressing, grouping
- Cause and effect programming

Use (Occupier)

- Automation and personal control
- Intervention

Use (FM)

- Scheduling – Scene
- Maintenance – Triage and Fix
- Reportage – Energy, Occupancy

Easy Life

Increased expectations



Configure & Commission

- Integration – Blinds, Room booking, Guard controls, Energy saving

User

- Decorative, Colour, TuWh lighting
- Personalised intervention automation and tools
- Demand for Wellness at Work as a right

FM

- Predictive scheduling of energy commitments
- Efficient cleaning and maintenance
- Space management
- Integrated room controls
- Obvious Scenes and Modes built-in. Automation
- Occupancy knowledge
- Energy data analysis and billing (EMS?)
- Mobile working
- Fact based decision making

Increase
Building
Value

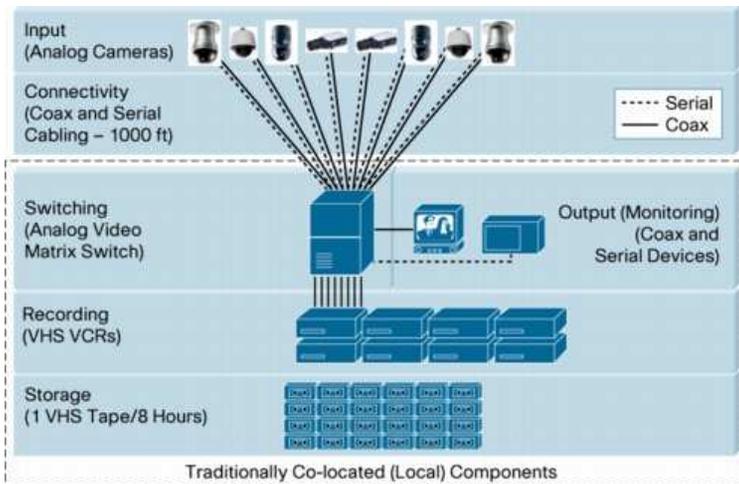
Master Systems Integrator



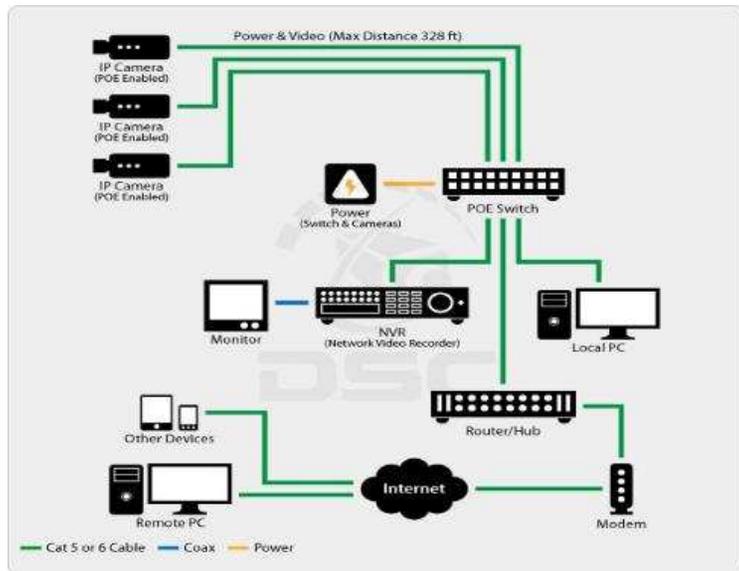
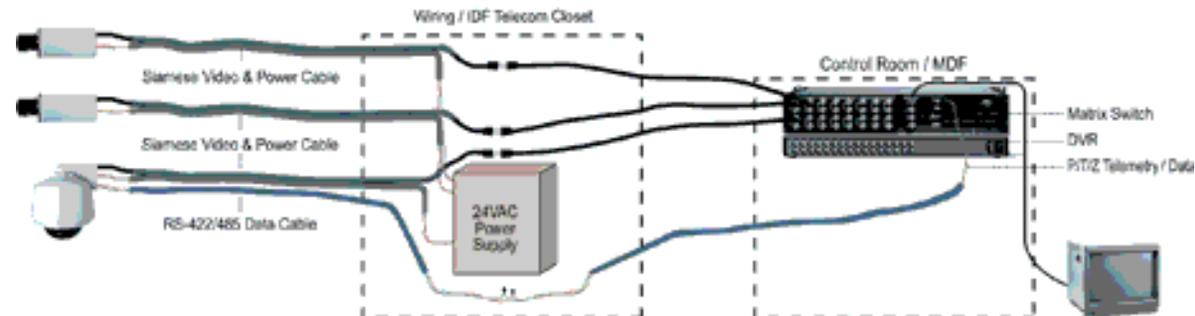
- Is lighting special? YES
- Is lighting more special than.....? NO
 - HVAC, Access Control, CCTV, Fire, PAVA, Phones
 - Pagers, AV, IP backbone, Energy, asset tracking
 - Intercoms, Intruder detection, Vending
- Non-physical systems too
 - Soft systems like ldap,
 - HR for job-based & personal preferences
 - Personal calendars and room booking
 - Catering service
- Lighting is the least complex
 - And Smart Lighting often only presents a simple scene control interface to BMS
 - BUT denying that it is part of a Smart Building ecosystem is ,holding on too tight to the baby‘
- Trend to MSI way of working will not tolerate siloes

Building
Wide
Ecosystem

GROWING PAINS –SYSTEM (LOOK AT CCTV)



Old Technique for Delivering Camera Power Video and Data



Star Wired analogue to IP digital
 First IP, CPU low in cameras high in centre?

VCR to DVR to NVR to distributed
 Network storage

Manual retrieval to automation

Integration by H/W then S/W via IP

Growing Pains –System (look at CCTV)



- ❑ Storing pictures to storing data and history
- ❑ No analytics to central to distributed and in camera
- ❑ No industry IT/IP knowledge (or enthusiasm at first!?)
 - ❑ Lots of training and IP experience needed
- ❑ No interoperability standards to ONVIF

- ❑ Capex models to App store style licencing
- ❑ Integration to ACS, Fire, Intruder, Perimeter
- ❑ Sales by Use Case, Scenarios, Value proposition
 - ❑ Obviously cameras take pictures but that is now the least important thing.

LMS – BUS to IP



Current: BUS/IP DALI 2.0+ (or KNX/Lutron)

IP boxes with web page configuration of groups and behaviours, interoperation of boxes, BACnet for BMS

The boxes run logic and blinds control and temp sensor and local HVAC output capability – basic room controls.

They talk to each other BUT really are focussing on the things hardwired to them.

Bigger ecosystem is still BMS Controls and boxes that might have the DALI control inside.

Emerging: IP to luminaire

Wired IP, PoE+, UPoE,

Wifi and 6LowPan wireless

Future: OpenAIS

Full IoT, IPv6, wired and wireless

Open standard for intelligent, interoperable solid state lighting

Platforms for tools, applications & innovation

Future: IoT

- Full IoT, IPv6, wired and wireless
- PHY independent (Wired, RF, Powerline)
- Open standards
- Platforms for tools, applications & innovation
- Interoperability
- Synchronised, Scaleable, Secure

IoT is not a hierarchy

Where does software run?

Box, router, luminaire

Database and API's

Lighting Smarts built-in

1000's of shared data objects

Analytics

Local Time to Light

Cloud response time

Several things still to solve and the h/w hierarchy is gone

Growing Pains – Supplier (look at yourself)



LM Supplier does building

Specify blind controls?

Room comfort spec sensors?

AV interfaces? APIs? Apps?

Training

Room controls and HVAC?

Other systems interfaces?

Databases and IT

Business model

How do you sell these other things?

Direct or via collaboration?

BM Supplier does lights

Specify a lighting design?

Plan power and signal

Training

Lighting use cases and control logic?

Databases and IT

Already works with Energy, FM, IT , Security etc

Business model

Commission 2000 lights cost effectively?

Buy the parts and pay an electrician

Collaborate with experts

What do you know about the other things and cloud and data security?

Growing Pains – You are not alone



iBuilding Management System

- Wired hierarchy of sensors, mix of field protocols
- BACnet control boxes over IP
- Data to cloud for analytics

Physical Security Information Management

Enterprise Management

Are these three systems, one system or experienced as several?

Shared sensors? Alarm and alert handling? Cause and effect speed? Data sharing?

Analytics? Dashboards? Complexity? Many new use cases in reach....

IoT business models and opportunities



Business models and supply chain: Both impacted by renting vs buying

- ❑ CAPEX vs OPEX? Rent vs Buy? SaaS and LaaS? VaaS?
- ❑ ROI. Do all new benefits mean clients have more money to spend on the lighting?

Are they buying products or outcomes?

Comfort, safety, energy, rentability, future proofing?

Buy occupancy space management and get free new lights?

Does software have more value than the hardware? What is tangible?

Only one supplier of lights and boxes and sensors?

Does hardware need maintenance any more?

IT and IoT companies and App developers embrace the new models and have the resource to have a go to steal your software sale and run it on their hardware.

- ❑ Opportunity cost?

Put more IP infrastructure in for future proofing

Put sensors in when the lights go in

And now BIM



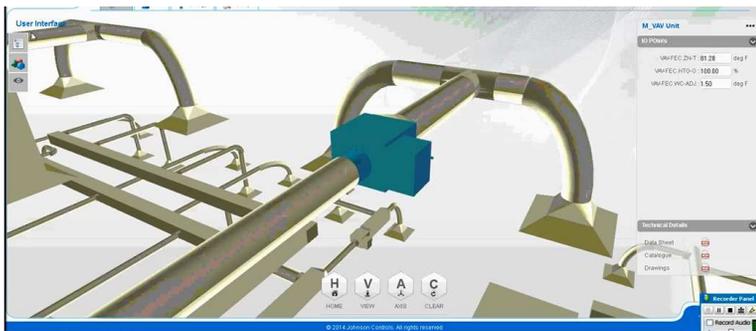
- ❑ BIM analysis: building performance design

Materials & Building behaviours. Physical design clashes

- ❑ Why not lighting design

Already does the general plumbing and cabling

Imagine it estimated cables & the lighting design into the building and pre-defined the obvious groups and triggers and scene/modes too...and downloaded that as the controls



Design by hand or automatically?

Space types

Space behaviours

Luminaire and sensor groups

BIM reduces re-work and forces honest sign-off



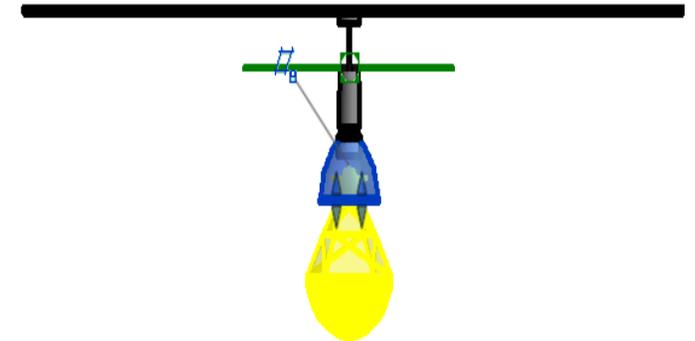
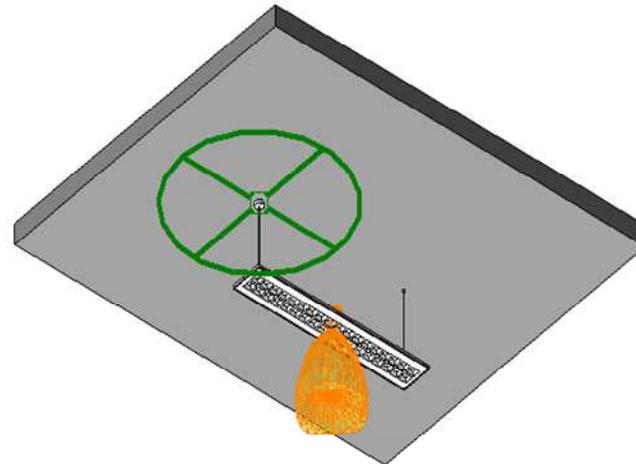
3D Context

Project status

Online status

DIM status

As-Built - Instant QA



Can do this in 2D BUT disparate tools and phases with no analysis

BIM (or other tools) could seamlessly oversee the whole lifecycle.

Significant pre-sales benefit. Untapped post-sales benefit.

❑ Harder to change the spec or design after the lighting design was done already as part of the RFP. Very hard to fool the customer when handing over the commissioned system.

Master Systems Integrator



- M&E model**
 - Generally supports low price and silos
 - Electrical is lighting
 - HVAC control is mechanical
 - IT is IT

- Master Systems Integrator**
 - De-scope the Integration tasks
 - Owns the customer SMART vision
 - Use outside experts where needed
 - Works in the model with traditional supply

- Is IoT a generic commodity?**
 - Who installed the sensors?
 - Who supplied the compute power?
 - Who supplied the lights?
 - Don't care, just make them interact and use the data wisely

How to put IoT architecture into Lighting?



- IoT sensing is a burgeoning industry
- Many insecure implementations
- Many point to point that do not suit lighting groups
- Many wired or wireless, none seamlessly merged
- Many too slow to satisfy the time to light
- Synchronicity and scalability not so important
- Slow cloud analytics, big next day data
- Single points of control failure as sensors not critical
- Proprietary with limited access

It would be good if someone solved all that so you could get on with the value added bits

IoT in lighting is coming



☐ Lights are things too

We are solving the hard bits, the IT, IoT, Security, TTL, Data

You do the rest

.....or I will....or an app developer ..or an IT provider.....or
actually anyone that can see an opportunity.

Lessons Learned



- ❑ IoT means many things – mostly fear
- ❑ Opportunity to vastly increase lighting controls market
- ❑ IoT solves the technical problems it brings but you solve the new business models
- ❑ iBMS can absorb LMS. BIM improves both. Hierarchies flatten, FM accesses favourite Apps.
- ❑ New Use Cases emerging as it all becomes easy to achieve – expectations can rise and be fulfilled