



Open Architectures for Intelligent Solid State Lighting Systems

OpenAIS Symposium:

Integrating Lighting in the Internet of Things

Eindhoven, May 23rd 2018

Frank van Tuijl, Project Manager
Philips Lighting



Supported by the Horizon 2020
funding of the European Union



ZUMTOBEL



TU/e ARM

TRIDONIC
enlightening your ideas

PHILIPS

The “White Lady”, Eindhoven A building with lighting and architecture provenance



A former Philips factory built in 1930 in which light bulbs were made. Renovated by the City of Eindhoven it is now a national monument and in daily use as offices. Architects from all over the world study and visit the building for its remarkable design.

In the last quarter of 2017 400 luminaires, with a mix of manufacturer, wired PoE and wireless controls will be installed for a 6 month trial period starting Jan 2018. GGD looking forward to energy savings, personal controls, human centric automation and new apps.

- ... on behalf of the OpenAIS Board and the host GGD-BZO



// Symposium outline



- Keynote by Cisco
- Present the main OpenAIS project results:
 - User Scenarios
 - System Architecture
 - Pilot demonstration in de GGD Office
 - Pilot validation results
 - Lessons learnt
- Interactive focus groups on specific topics
- Wrap up and drinks

// Agenda



09:30	Registration and coffee		
10:00	Welcome and introduction		Frank van Tuijl (PHL)
10:15	Key Note speech by Cisco		Peter Dijkstra (Cisco)
11:00	OpenAIS Project approach		Stefan Verbrugh (PHL)
11:15	OpenAIS Scenarios and use cases (John)		John Sayer (JCI)
11:35	How does it work? OpenAIS architecture		Walter Werner (Werner Management Services)
12:05	Announcement from Luger Research		Bronwen Rolls
12:15	Lunch	Pilot office visit (in groups)	
13:45	Validation results from the pilot		John Sayer (JCI) Thomas v.d. Werff (TU/e)
14:15	Lessons learnt		Stefan Verburgh (PHL) Amyas Phillips (ARM) Alin Lazar (NXP)
15:00	Break		
15:20	Focus groups on specific topics		
16:10	Feedback from the focus groups (plenary)		
16:30	Conclusions and outlook		Frank van Tuijl (PHL)
16:45	Closure and Drinks		

// House keeping

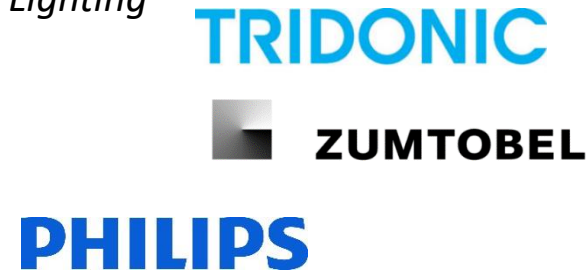


- 81 people registered (NL,D,UK,AT,B,US,DK,CZ,SLO,CH)
- Pick-up your badge at the desk
- Switch your smart phones to silent
- Guest Wifi available
- Presentation slides will be posted on openais.eu

Building control/installation



Lighting



Non-profit academia



IoT & Silicon



- Precompetitive R&D collaboration
- 3½ years, Jan 2015 - June 2018
- Philips Lighting project coordinator



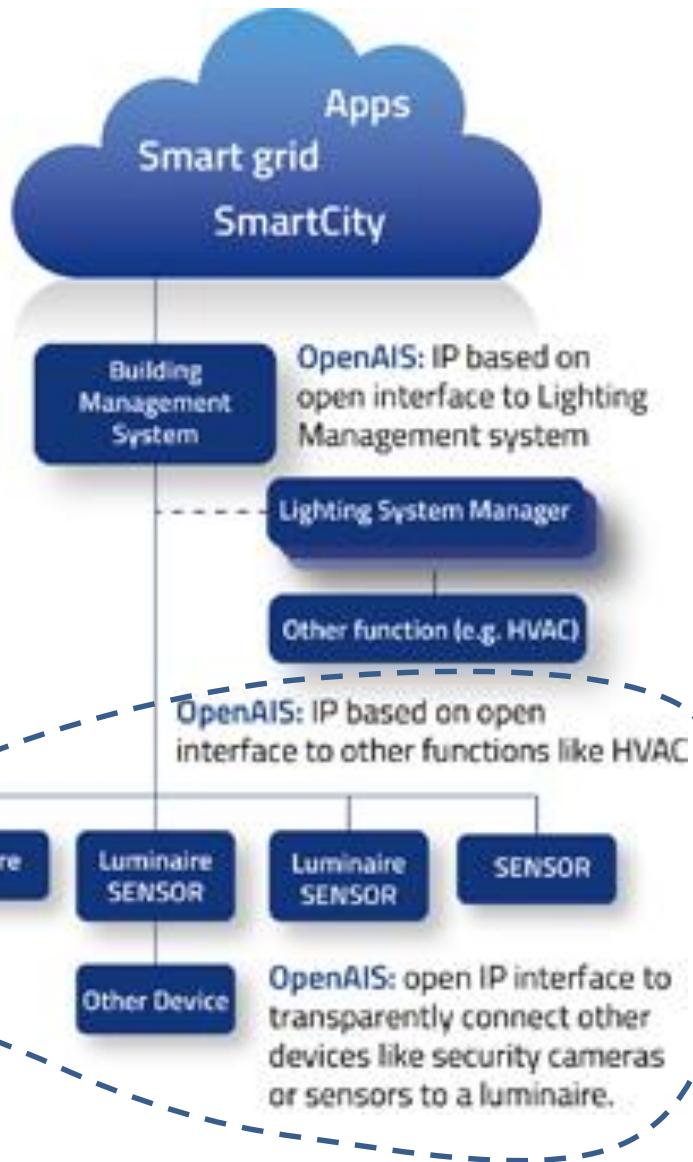
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- **Create an *open* architecture standard for IoT connected lighting in professional buildings**
 - Applying IPv6 to the end nodes
 - Allowing multi-vendor systems
 - Enabling commercially differentiated solutions
 - based on (emerging) IoT-standards and ecosystems
- **Validate this approach by a large-scale pilot** in a real office environment, demonstrating the promises of interoperability.

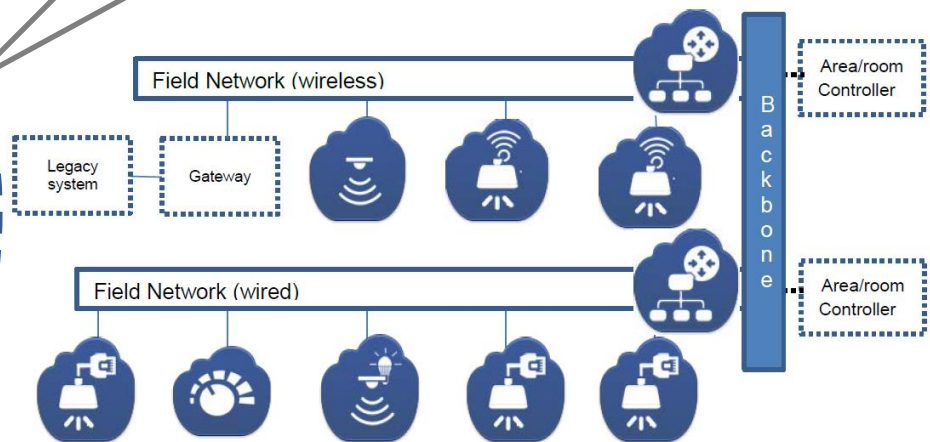


- **Lighting will be part of the Internet of Things,**
Lighting will be integrated in the building IoT infrastructure, enabling the delivery of additional functionality beyond lighting (safety, security, energy, HVAC, ...)
- **The near future demands open and interoperable multi-vendor solutions**
Today, the landscape of IoT-based Lighting systems for professional environments is mainly proprietary solutions.
- OpenAIS aims to provide an **open ecosystem to enable a wider community to deliver the smartness of light.**



A reference Architecture for:

- **Control and communication** architecture for prof indoor lighting.
- A **multi-vendor** and open IT connected systems
- Need for **differentiation**, openness and future developments.



- Identify **user and system requirements** for the 2020's
- Define the best **System Architecture** for connected lighting:
 - To meet the requirements of the 2020's
 - Exploiting the **Internet of Things**
- Realize a **pilot installation** in a real indoor setting
- **Validate** whether the Pilot installation meets the requirements
- Prepare **standardization** by engaging with **SDO's**

// Main uses cases results

- **Easy Life**

“...a solution that is easy to **specify, design, install, commission, operate and maintain** without making compromise on ease of use.....



EASY LIFE

- **Increase Building Value**

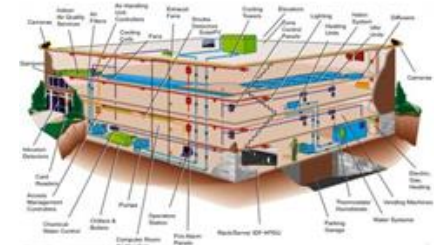
“...in the changing world of office space and provision owners will need to make their **properties more attractive** for businesses to lease or rent.....”**trophy workplaces**” making visits to the office a luxury and a rewarding experience.....



INCREASE BUILDING VALUE

- **Building Wide Ecosystem**

“...in the future, systems in a building will be expected to **share sensors** and, interoperate to the benefit of the building and their stakeholders



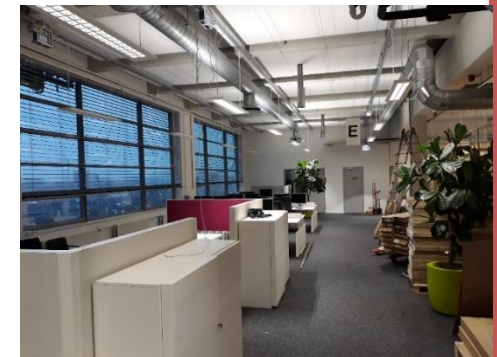
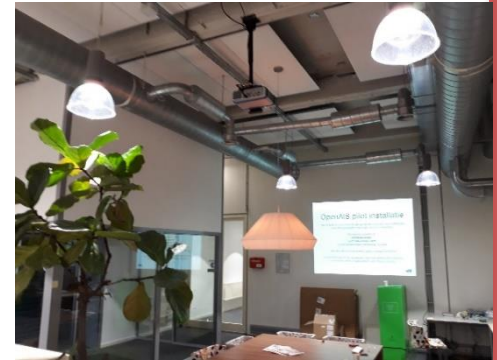
BUILDING WIDE ECOSYSTEM

// System Architecture Results



- Existing **IoT architectures** do not fully meet the requirements from lighting industry & stakeholders, gaps identified:
 - **Low latency secure group communication** (IPv6 multicast)
 - Daily operation **not dependent from central server**
 - **Object models** for high quality lighting and integration into BMS.
- **Architecture solutions** have been provided to resolve the gaps:
 - Open (secure) Group Communication (OGC)
 - Object data model (API)
- Reference Architecture has been **published:**
(<http://www.openais.eu/en/results/>)

- **Interoperable: vendors mixed in single system**
 - 400 nodes: Philips and Zumtobel luminaires
 - Commissioning Tool (Dynniq), BMS (JCI), Apps (TU/e)
- **Hybrid wired and wireless networks:**
 - Ethernet and Thread CE (ARM and NXP)
 - Power over Ethernet and mains powered
- **Advanced lighting control strategies:**
 - Local occupancy and light level sensing per luminaire
 - Granular sensing and control strategies (local dimming)
 - Personal control via Office App
- **BMS Integration**
 - (Direct) access to data collected by lighting system: occupancy & energy data



Thank you

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