OpenAIS: Towards an open system architecture for IP connected lighting

Stefan Verbrugh
Philips Lighting B.V.
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Consortium

Johnson Controls

Philips

Zumtobel

TRIDONIC

NXP

ARM

TU/e

ESI

Covering the whole value chain

3 years, Jan 2015 - Dec 2017
Philips project Lead

Supported by the Horizon 2020 funding of the European Union
Project Aim

- Define an All-IP open Lighting system architecture
- Support maintaining the leading position of the European lighting industry in the IoT era
- Align the European industry to adopt this architecture
- Enable eco-system of suppliers of interoperable components
- Create renewed value space for European Industry
OpenAIS target application

- Professional Indoor
- Focus on Offices
  - New builds and refurbishments
  - Small and large installations
- Global, but validation will be in Europe
OpenAIS Vision

Make lighting part of the Internet of Things

The Internet of Light:

- IoT is the future for connected Lighting
- IP connectivity to each luminaire (IPv6)
- Exploit standards and HW & SW components from other IoT applications
  - Achieve economy of scale
  - Standards maintained by much larger industry
- Open architecture enables: Use of multi-vendor equipment
- Extendable architecture allowing software application updates to extend control functionality after installation
- Serves as a valuable infrastructure for other functions in a building

200 – 400 million luminaires/year sold in 2020 → number of lighting nodes can become considerable (estimation 35 – 75 billion total IoT nodes WW)
Challenges in a changing world

• IoT is an emerging concept:
  – OpenAIS is running in parallel to IoT being shaped
  – Numerous protocols and standards, which to be used for lighting?
  – Unified Data Model for lighting and BMS

• Identify new value spaces, related to:
  – Use of office buildings in the 2020’s
  – Technical possibilities of the 2020’s

• Data privacy & Protection

• Shape towards a Dominant Design
Technical challenges

- Security of constrained devices
- Align domain model lighting & building automation
- Network: Shared IT or dedicated lighting
- Low standby power
- Interoperability between vendors
- Long system lifetime support (20+ years)
- Extensibility: add functions over lifetime
- Balance system cost vs added value
- Facilitate easy specifying, installing, commissioning and maintenance
Project plan (1)

- Identify system requirements for the 2020’s
- Define the best System Architecture for connected lighting:
  - To meet end user needs of the 2020’s
  - Exploiting the Internet of Things
- Validate in a real setting whether anticipated user needs are met
- Prepare standardization
WP 5: Validation by pilot implementation
- Installation at pilot customer
- Assess performance

WP 1: Scenarios and Requirements
- Interviews
- Update and complete

WP 2: System Architecture
- Architecture
  - Candidates
  - Final
- Architecture public via www.openais.eu
- Review + extend SW

WP 4: Integration of components
- Integration
- Integration

WP 3: Design and realization (building blocks for integration and for pilot)
- Make HW & SW building blocks
- Building blocks for pilot

2015 2016 2017
Process of defining the requirements

**Identify Stakeholders 2020’s**
23 Stakeholder types, e.g.:
- User (office worker)
- Building Owners
- IoT/IP Providers
- Consultants & Specifiers
- Installation companies
- Application writers
- Lighting companies

**Interview stakeholders:**
- Vision 2020’s
- Experience with existing systems

Over 700 scenarios collected, now combining, clustering and selecting

**Scenario’s & use cases 2020’s**
- Facilitate activities
- Comfort & Wellbeing
- Efficient building management
- Ease of installation, commissioning

**Quality Requirements**

**Scenarios Workshop**

**OpenAIS Requirements**
Office trends

Nomadic behavior

Responsive and adaptable environments

Digital environments

Intensive collaboration

New work experience

Total Engagement
Scenarios Workshop

- 2-day workshop with team members and visionaries
- Analyzing trends in offices and brainstorming about consequences for OpenAIS system
Some examples of key topics mentioned:

- **Buildings Facilitate the activities of its users**
  - The building is welcoming, shows where to go (also if someone comes once or for the first time)
  - Facilitate efficiency of activities

- **Buildings enhance Comfort and Wellbeing, e.g.**:
  - Attract and keep scarce talents
  - Create a feeling that the employer cares about the people
  - Natural atmosphere by change Color Temperature and intensity over the day or in accordance to the weather conditions
  - Control the lighting with smart phone or via PC
Interviews (2)

• Strengthen efficient building management:
  – Use occupancy sensor information to detect which areas are often used and which are rarely used → optimize the building use
  – Reconfiguring the lighting must be easy and not require an expert
  – Detailed energy consumption report per floor or area
  – Cost saving: Trend towards less m² per person → accepted by office workers if the building offers more comfort

• Concerns:
  – Too many parties involved, risk of responsibility shift
  – IP luminaires too expensive
  – Need a different installer for IP devices
  – Need new tooling, especially for fault finding
  – Commissioning is currently too complex
Summary

• OpenAIS aims at the development of the Internet of Light with a strong consortium

• The OpenAIS project will develop and validate a system architecture for IP connected lighting

• The Internet of Light can lead to considerably higher added value of buildings

Don’t forget to keep checking our results at: www.openais.eu
Thank you

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Questions?

www.openais.eu