Software Defined Building: Building Automation of the Next Generation

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Overview

1. What are the driving factors for digital buildings?
2. The digital building – Technology of today?
3. Software is the new hardware
4. Light out of the network
5. Security due to decentral structure

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World Market for Smart Buildings in bn U$

Source: Smart Building Markets Global Forecast to 2020, marketsandmarkets.com

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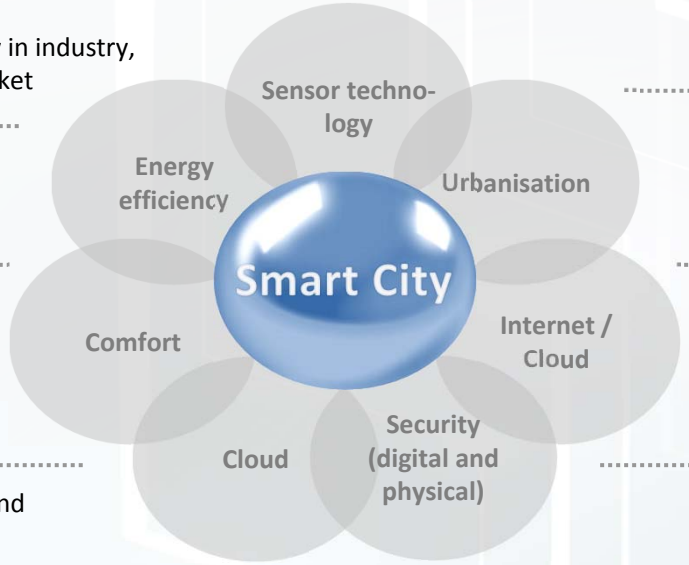
The Smart City
as a driver for Smart Building

Spreading of sensor technology in industry, commercial and consumer market

Protection of environment and resources

Development of automation of lighting, heating, climatisation and ventilation

New infrastructure platforms and services



New mobility, working worlds

Interaction of things, buildings, humans and machines

Increased demand for security due to higher risk potential

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What are the drivers for Digital Buildings?

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Energy Consumption

and the optimization opportunity

- Worldwide, buildings account for 40% of total energy consumption and contribute a corresponding % to overall carbon emissions
- In the US alone, businesses spend about US$100 bn on energy for their offices every year
- Smarter buildings could save (in the US) US$20-25 bn in annual energy costs.

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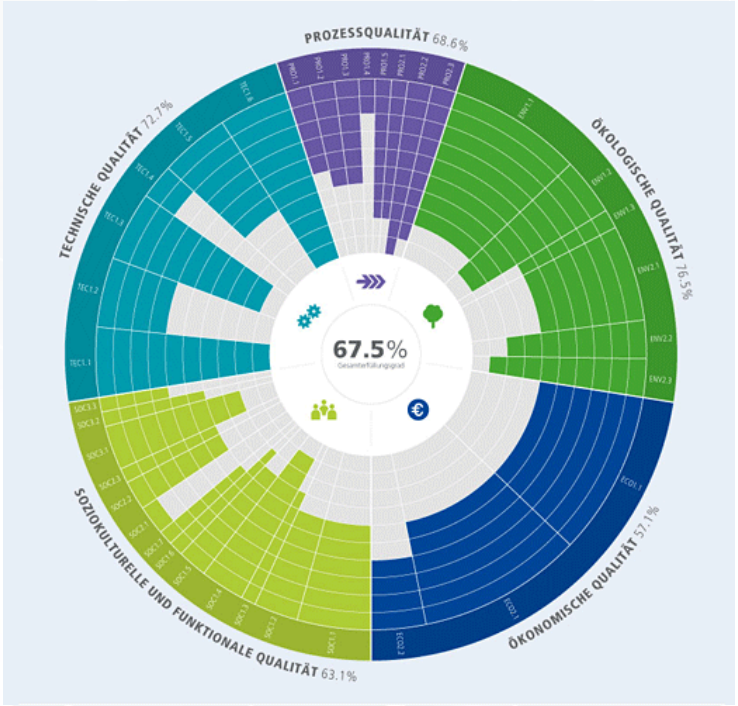
Energy Consumption

Deutsche Gesellschaft für Nachhaltiges Bauen
(German Society for sustainable building)

Certificates in Platin, Gold, Silver and Bronze.

40 criteria for sustainability out of 6 fields

- Ecology
- Economy
- Social, cultural and funct. aspects
- Technology
- Processes
- Location



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Assessment Criteria

(German Society for Sustainable Building)

ECO1.1 Building related cost over life cycle

Target is a reasonable and consciously use of the economic resources
economic resources during the whole life cycle of a building.
[..]

ECO2.1 Flexibility and conversion of use

Target is to design the building as flexible as possible and to reach a maximum conversion capability.
[..]

TEC1.4 Ability to adapt of technical systems

*Target is to plan the **technical systems** in a building in that way that it is possible to adapt them with minimal efforts to **changed terms of use** or respectively **technical innovations**.*
[..]

SOC1.5 Influence of the user

*Target is to offer the user a maximum **influence** for the room conditioning in terms of **ventilation, sun screens, temperature and lighting***

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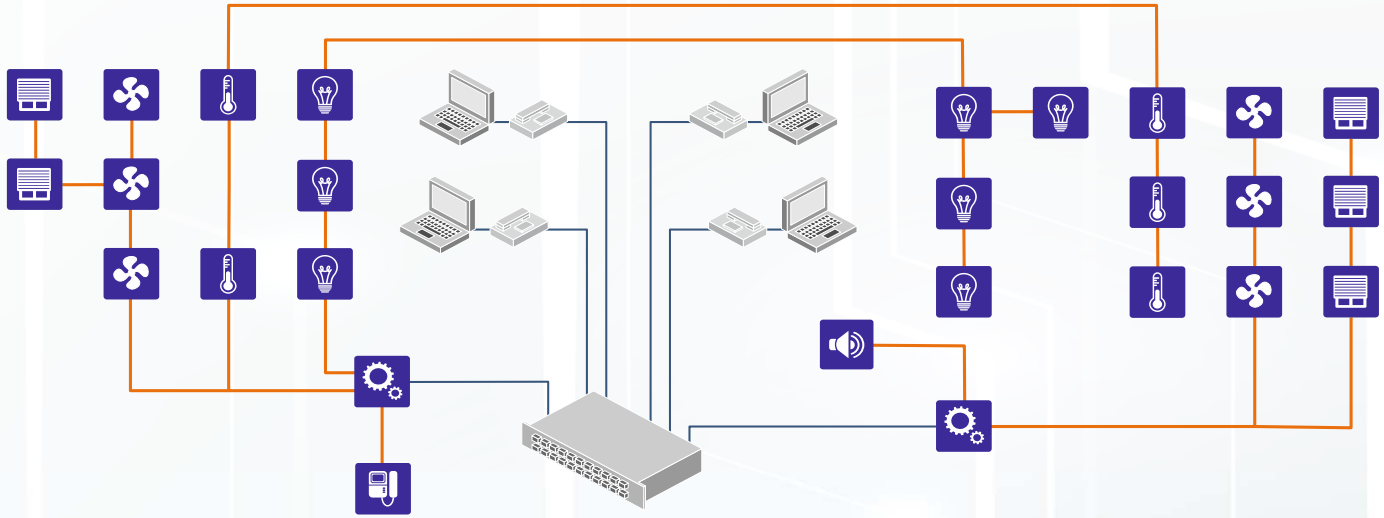
The Digital Building today

Separate systems for different applications



- Separate networks for data and building automation
- Time-consuming planning, commissioning, maintenance, adaptation
- Security not existing

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The convergence
of the IT and building automations systems

Traditional solution:
Individual networks

Future solution: Intelligent
IP standard network

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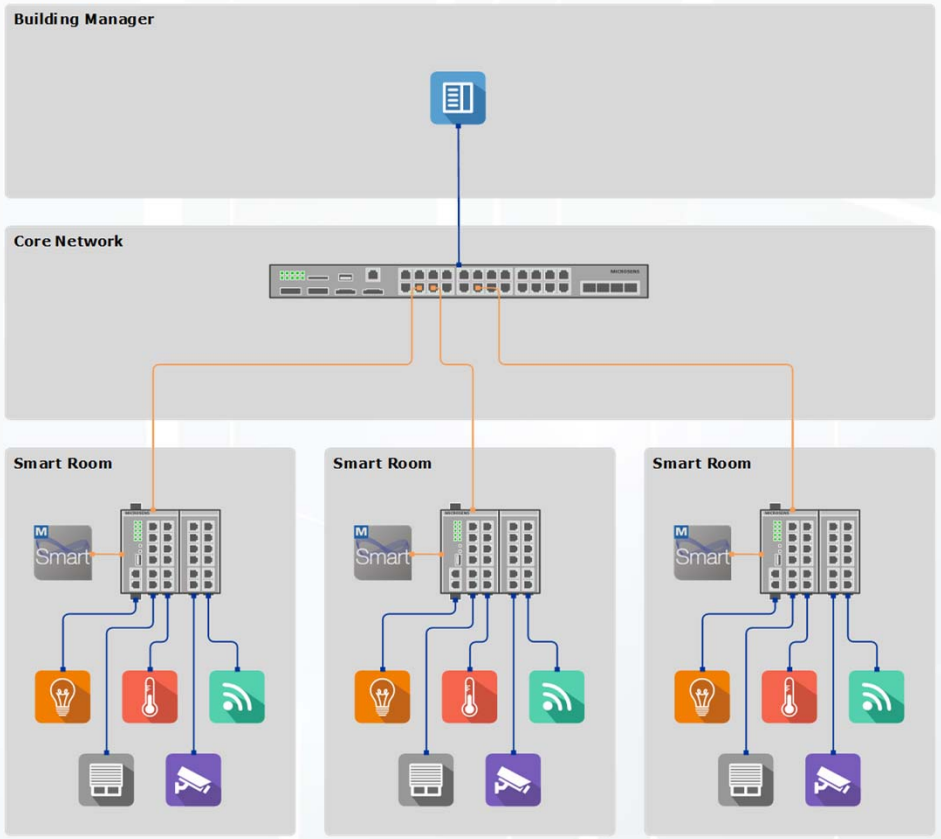
Smart Building Systems

Decentral architecture
- Room based control
- Central monitoring

Simple installation
- Room by room

High reliability
- Room operates partially autonomous



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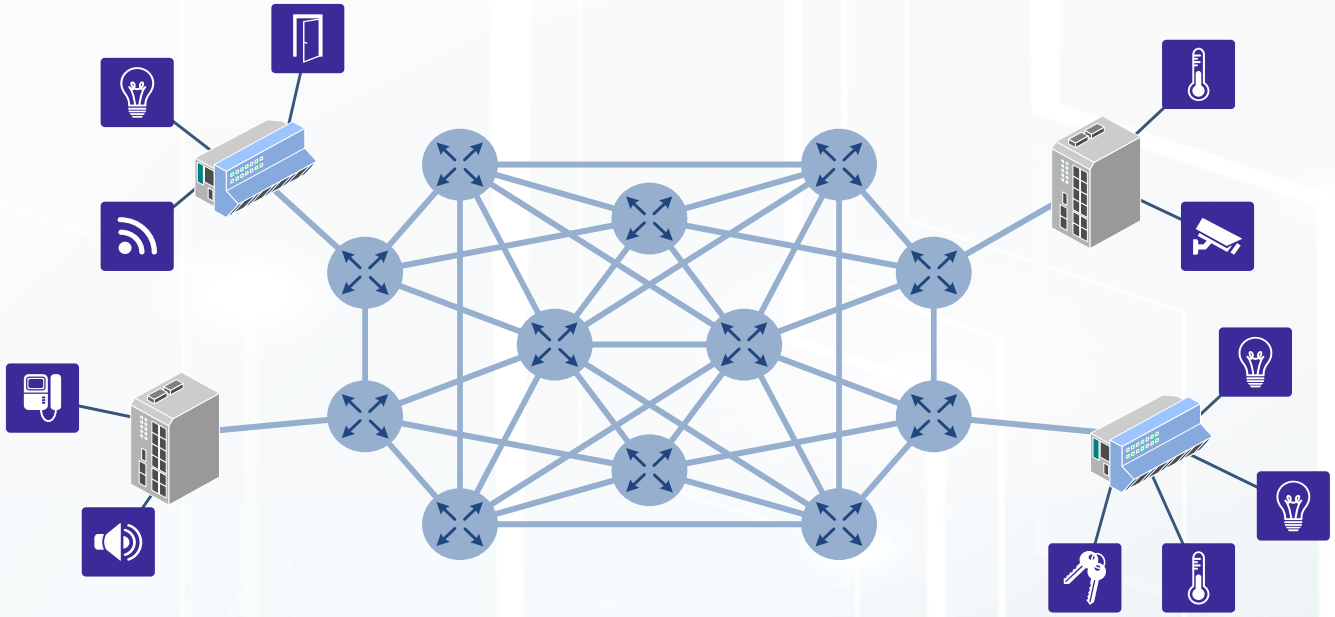
The digital Building of the Future

One network for all applications



- Secured isolated data streams
- Simple and quick provisioning of new services

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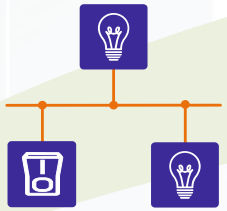
Flexibility

Evolution of the light switch

Simple
light switch

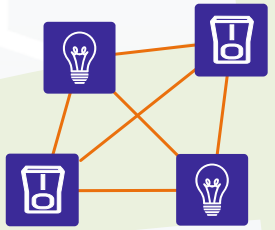
- only hardware
- fixed cabling



Digital

light switch

- system solution
- programmable comfort functions



Smart Building System

- networked and virtual
- function defined by software

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SOFTWARE

determinates function and added value

HARDWARE

is commodity

SOFTWARE is the new **HARDWARE**

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Economic Efficiency
with the example Lighting

Base Innovation 1
LED technology as efficiency engine

Base Innovation 2
Power supply out of the data network

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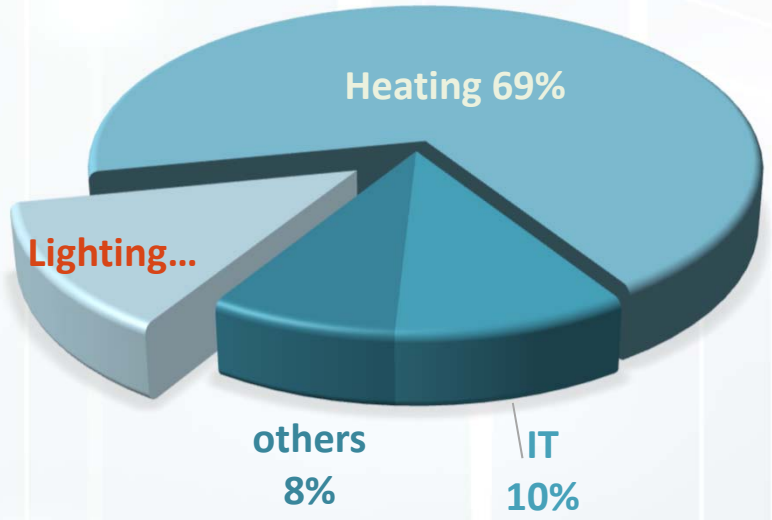
Energy consumption Offices Germany

- Total energy consumption lighting DE: 13,3 TWh
- Lighting: **45%** of the total electric power consumption and 13% of the total energy balance



Source: Energieverbrauch des Sektors Gewerbe, Handel, Dienstleistungen (GHD) 2011..2013 (Feb. 2015)

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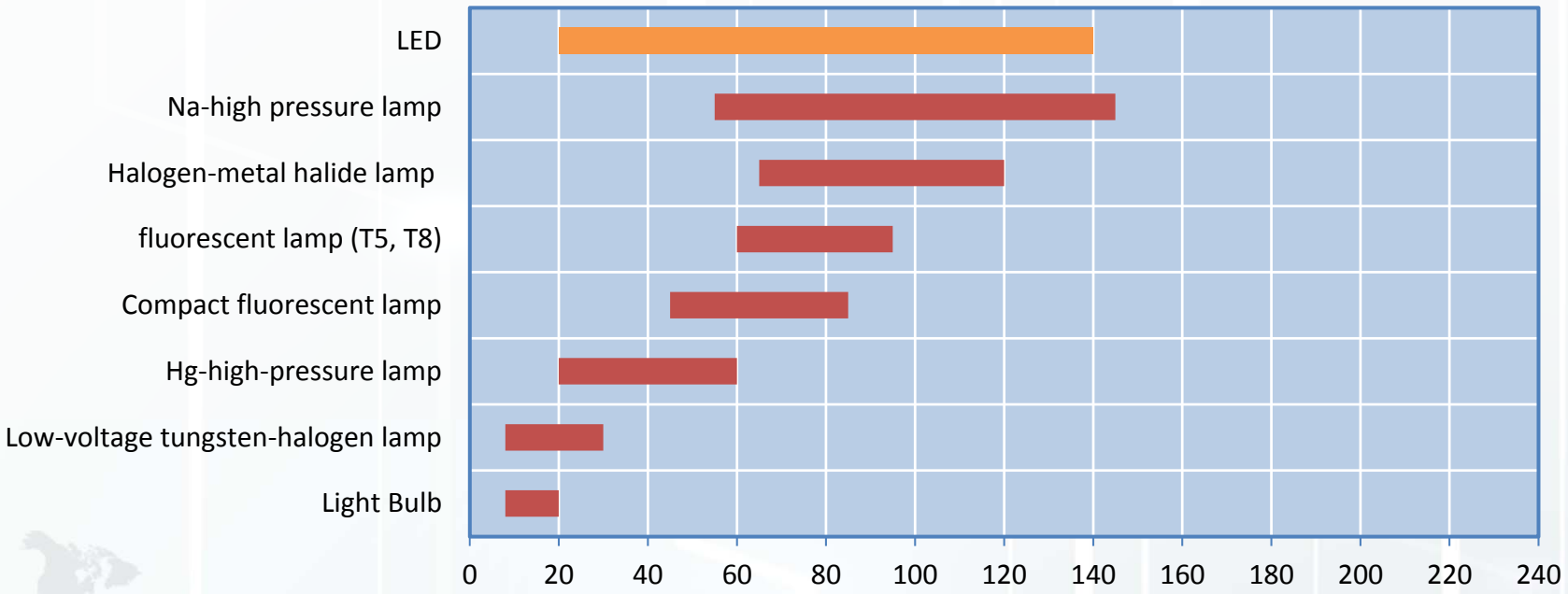
Efficiency of Light Sources

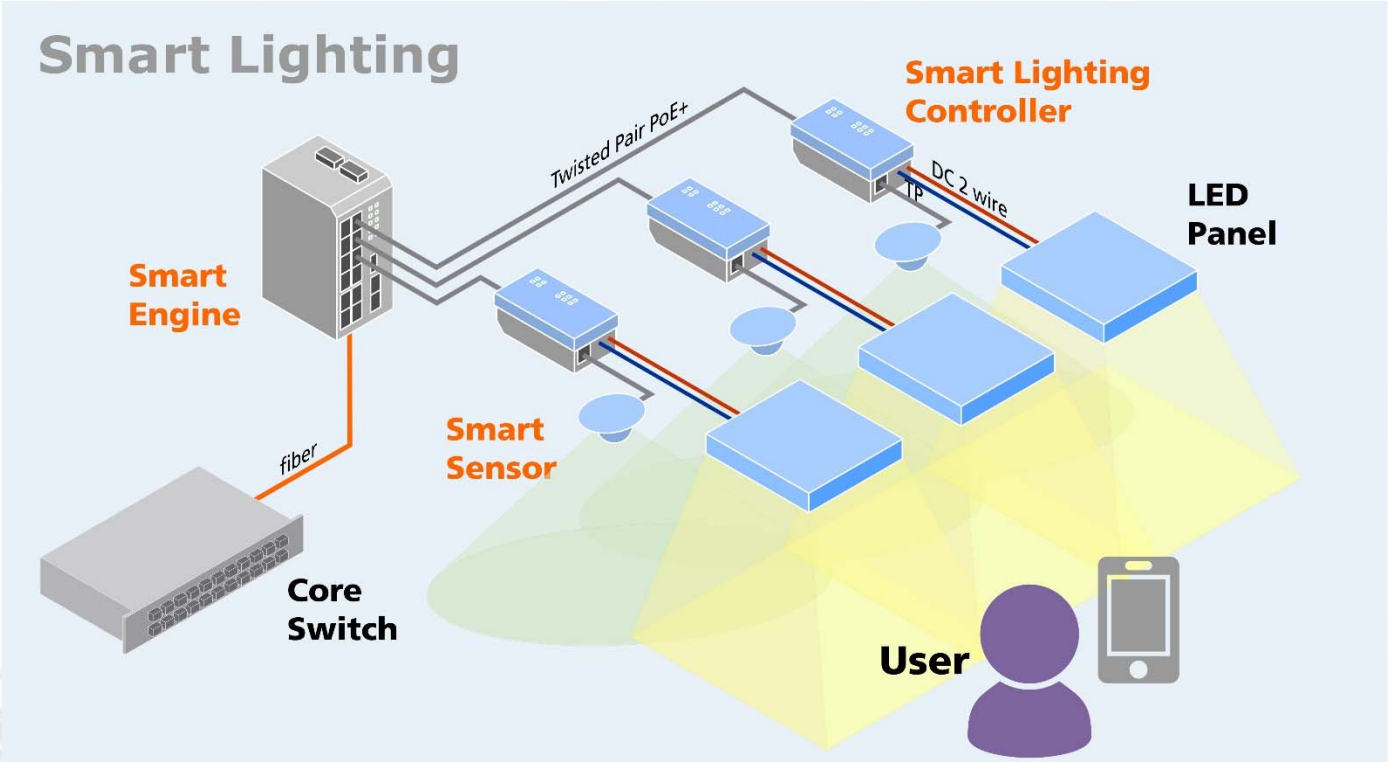
LED is unbeatable



Source: OSRAM

Smart Lighting System

Light provided by the network



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Smart Lighting System

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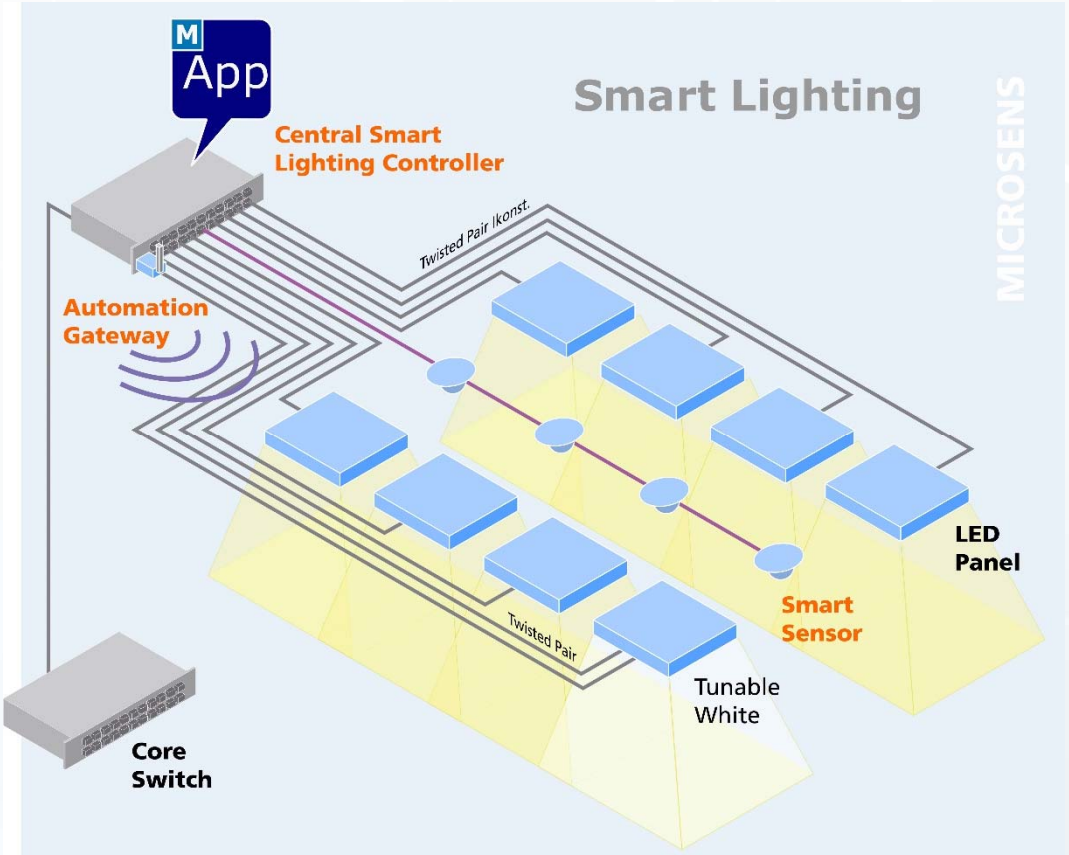

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Smart Lighting System

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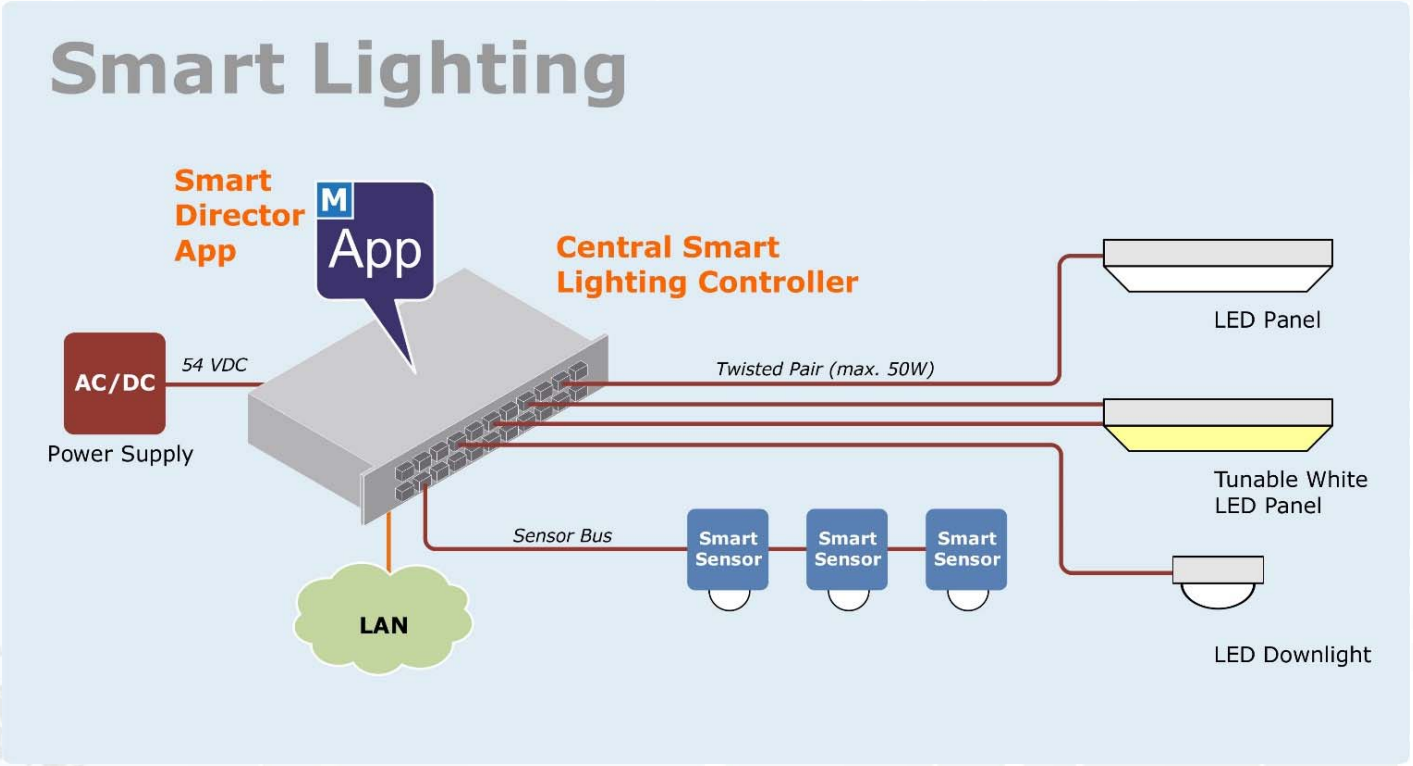

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Smart Lighting System

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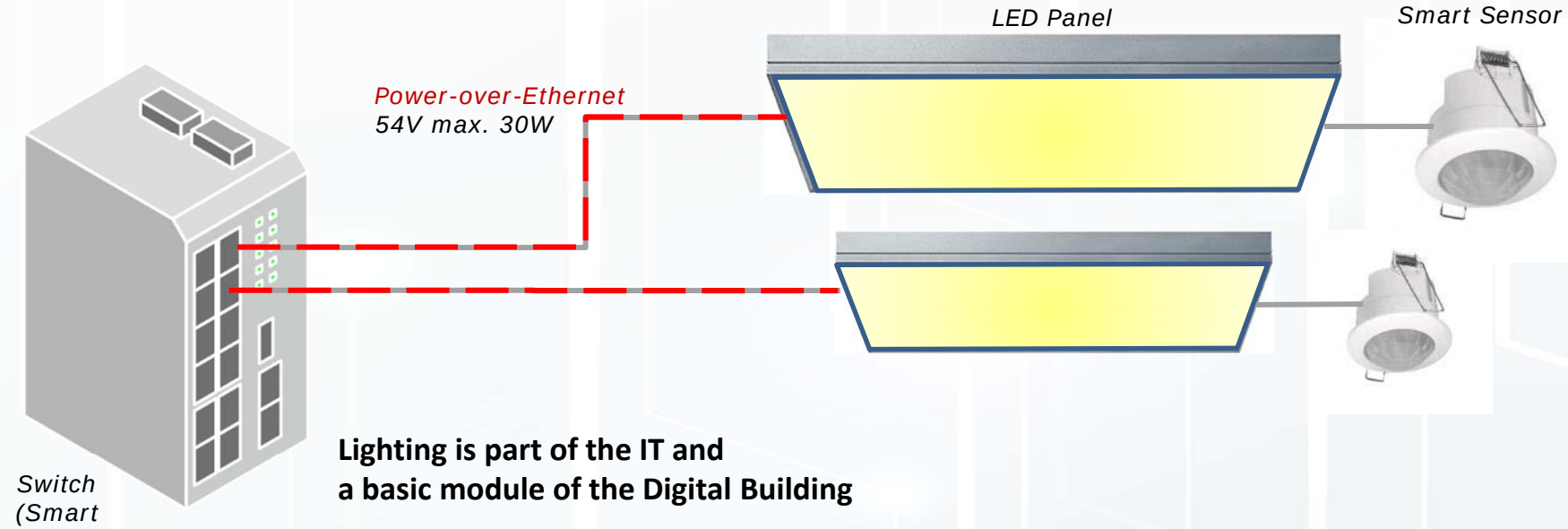

Lighting is part of the IT and
a basic module of the Digital Building

In combination with sensors, light becomes smart

- Automated dimming of light level saves energy
- Presence detection to power down if room is not used
- Follow-Me in corridors, emergency path lighting
- Network authorization to enable light

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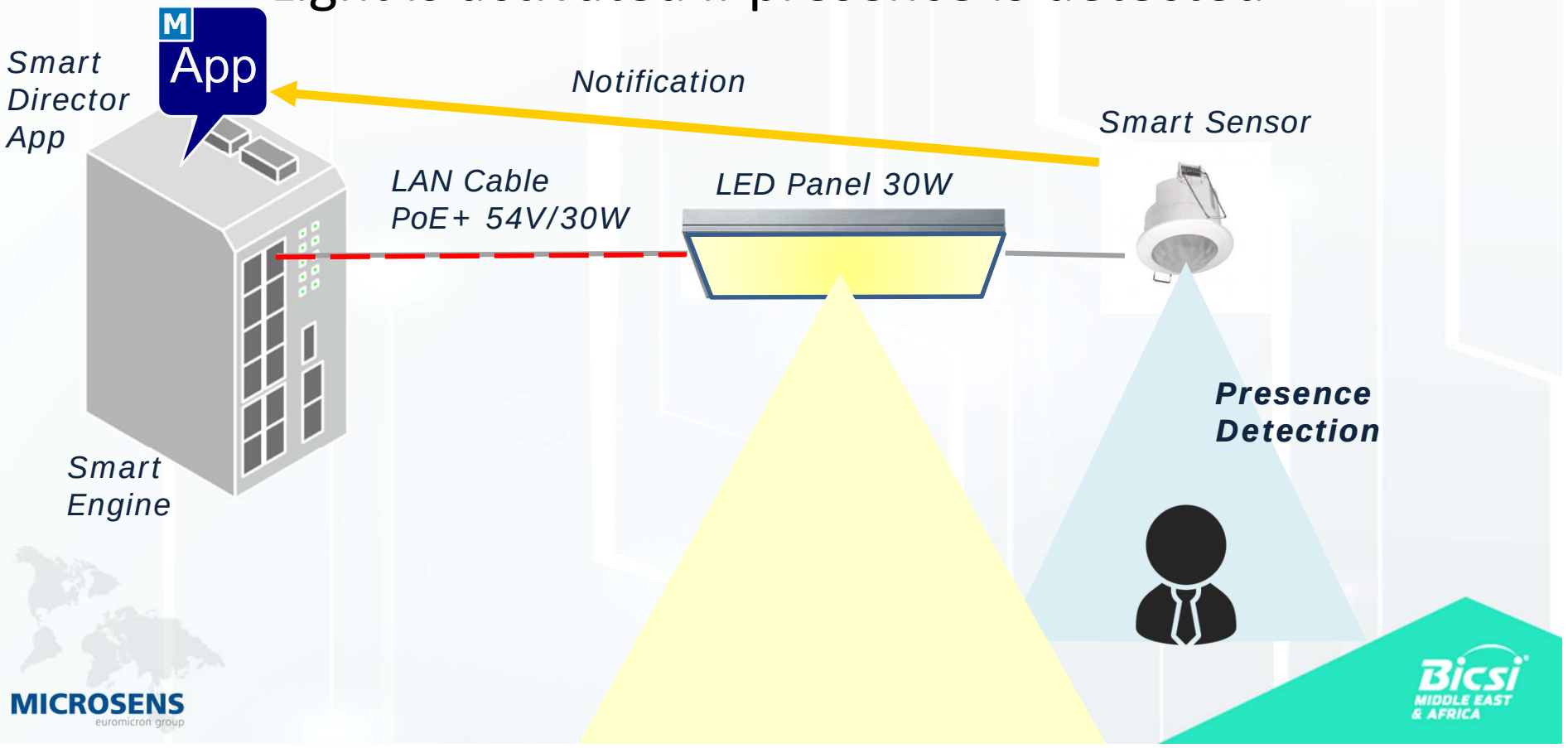
Smart Lighting System

Light is activated if presence is detected



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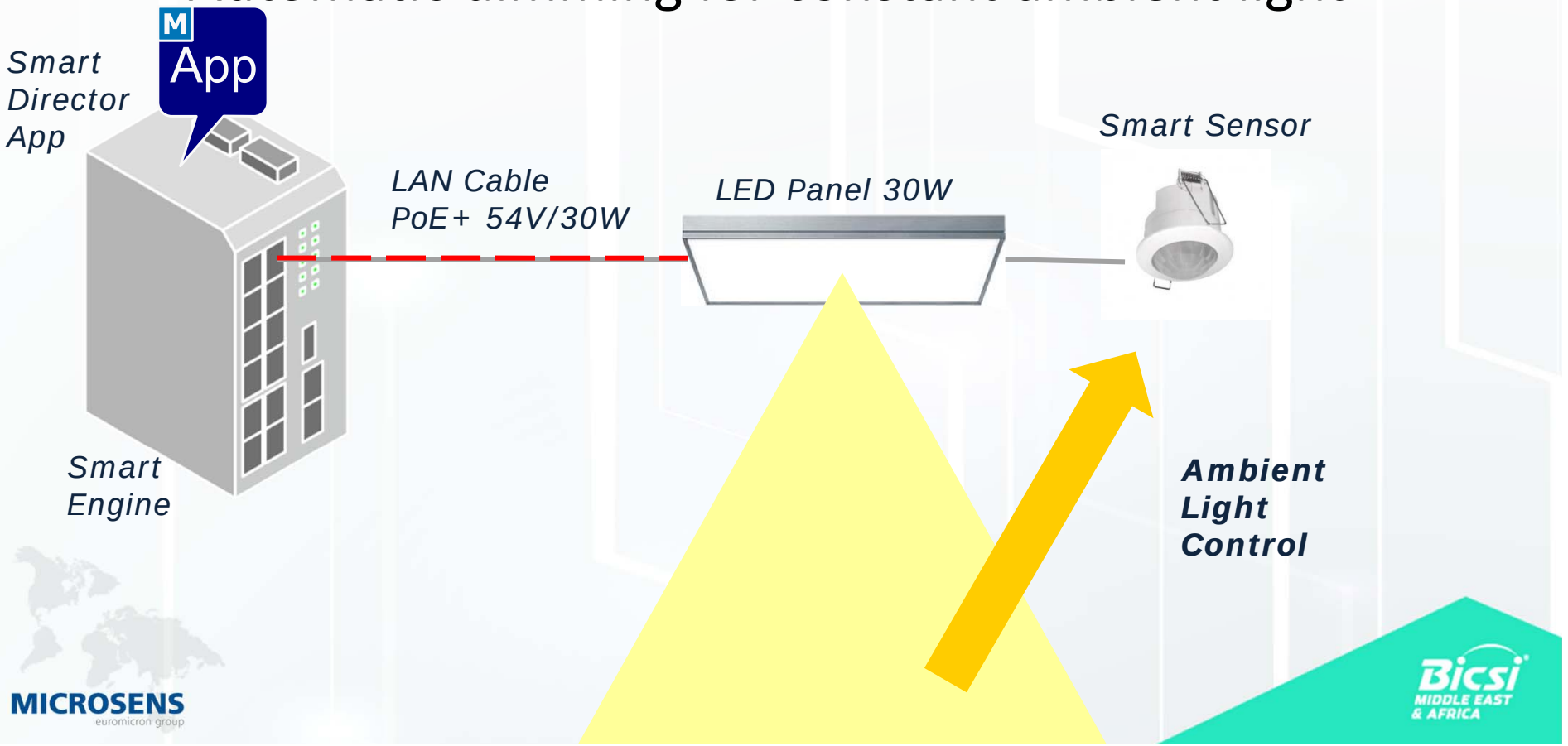
Smart Lighting System

Automatic dimming for constant ambient light



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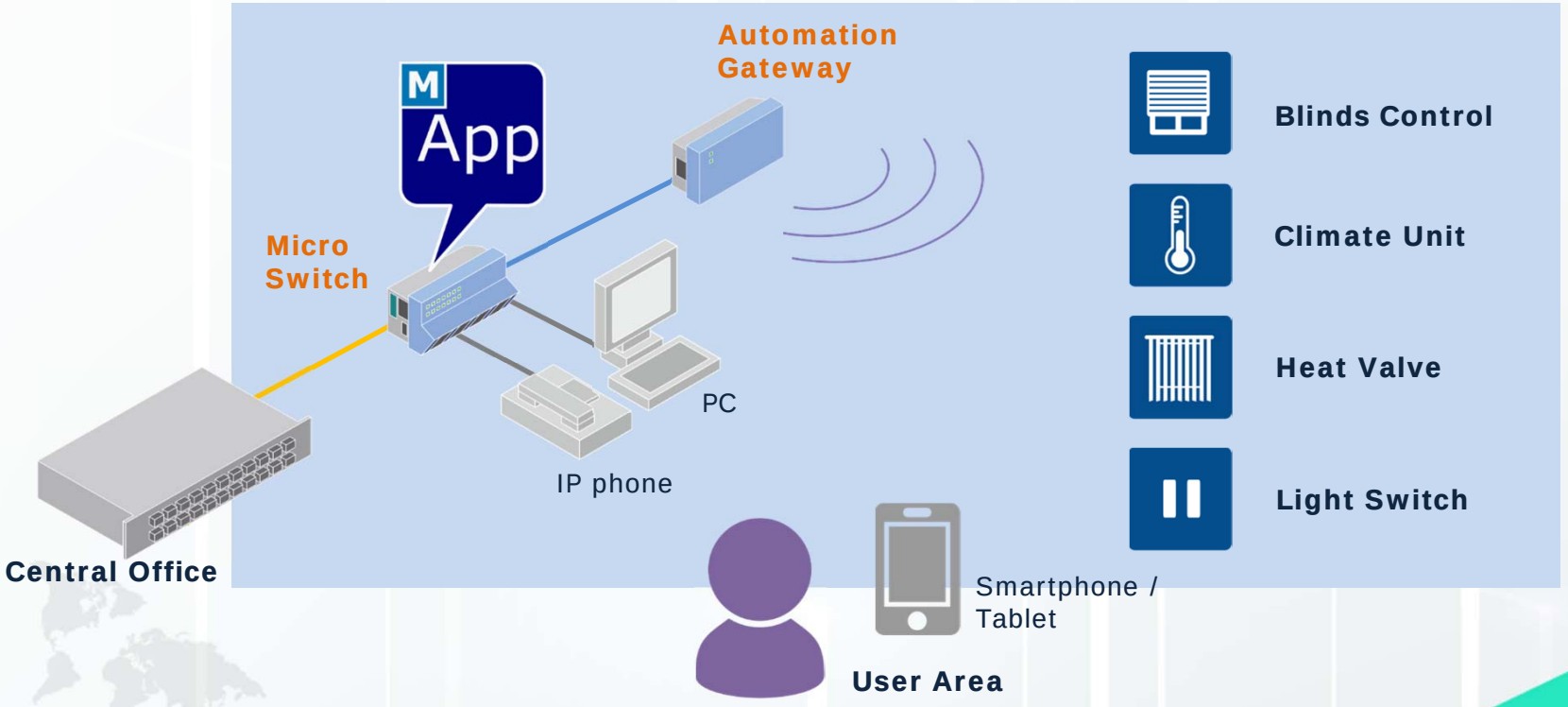
Smart Office System

Distributed Architecture



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Smart Office System

Distributed Architecture

Simple planning and installation

- Room by room
- No master plan required

Reliability

- Local failure has only local affect
- Local function in case of central failure

Integration in central Control Systems

- On Demand
- Open interfaces

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Security

The IT Security Challenge

In year 2020 more 25% of identified attacks in enterprises will involve IoT
Gartner, 2016

38%
increase in the number of detected security incidents

25+%
of identified attacks in enterprises will involve IoT

25 Bn
IoT Devices

48%
of incidents involved a malicious or criminal attack

256 Days
average to identify while data breaches

6,7 m
Average costs of each data breach

Source: PwC, "Global State of Information Security Survey, 2016
Gartner – Predicts 2016: Security of Internet of Things
Cost of Data Breach Study: Global Analysis Benchmark research sponsored by IBM Independently conducted by Ponemon Institute LLC

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Security

IT Security of the Building Network

- Secured **Standard Protocols** (encrypted, e.g. HTTPS)
- Port based **Access Control**
- Tiered **User Levels**
- Central **Security Management**

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Advantages of Smart Building
with example of the flexible Smart Office Concept

Economic Efficiency

- Energy savings: Lighting, heating, air conditioning only active when work place is in use
- Energy savings through consequent integration
  - Sensors
  - Dynamic linkage with control technology
- Prevent the waste of energy:
  - Open windows disable both heating and climatization
  - Automatic deactivation of lighting in abandoned rooms
- Optimized utilization of room capacity through dynamic allocation of workplace and meeting areas
- Beyond core times, automatic change into 'sleeping-mode'

Advantages of Smart Building
with example of the flexible Smart Office Concept

Security

- Work place is protected (data wise and physical) against abuse
- Workplace activation requires authorisation of the allocated user; automatic deactivation in case of absence
- Detection of unauthorised behaviour causes an alarm, e.g. if user enters a prohibited area
- IT security levels for Building Automation Systems as part of IP technology include
  - secured transmission protocols,
  - port based security,
  - IP Source guard,
  - secure management, etc.

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Advantages of Smart Building
with example of the flexible Smart Office Concept

Flexibility and Comfort

- Individual configuration of the work place by the user
- Dynamic creating of user groups
- Both building and room identify their user(s)
- Interaction of various systems:
  building access control, alarm system, HVAC control, Lighting control, building operating system etc.
- Automation of processes:
  IF user passes slip road THEN automatic parking lot assignment, elevator request, dynamic allocation of working place, activation and configuration of both workplace and indoor climate

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Advantages of Smart Building

with example of the flexible Smart Office Concept

Reduced maintenance efforts

- Automated Fault Detection help reduce the downtime and O&M costs
- Alarm management - timely and targeted interventions in case of faulty or under-performing building equipment
- Automated Diagnostics – easy detection of erratic situations, fast resolution or workarounds in case of known problems

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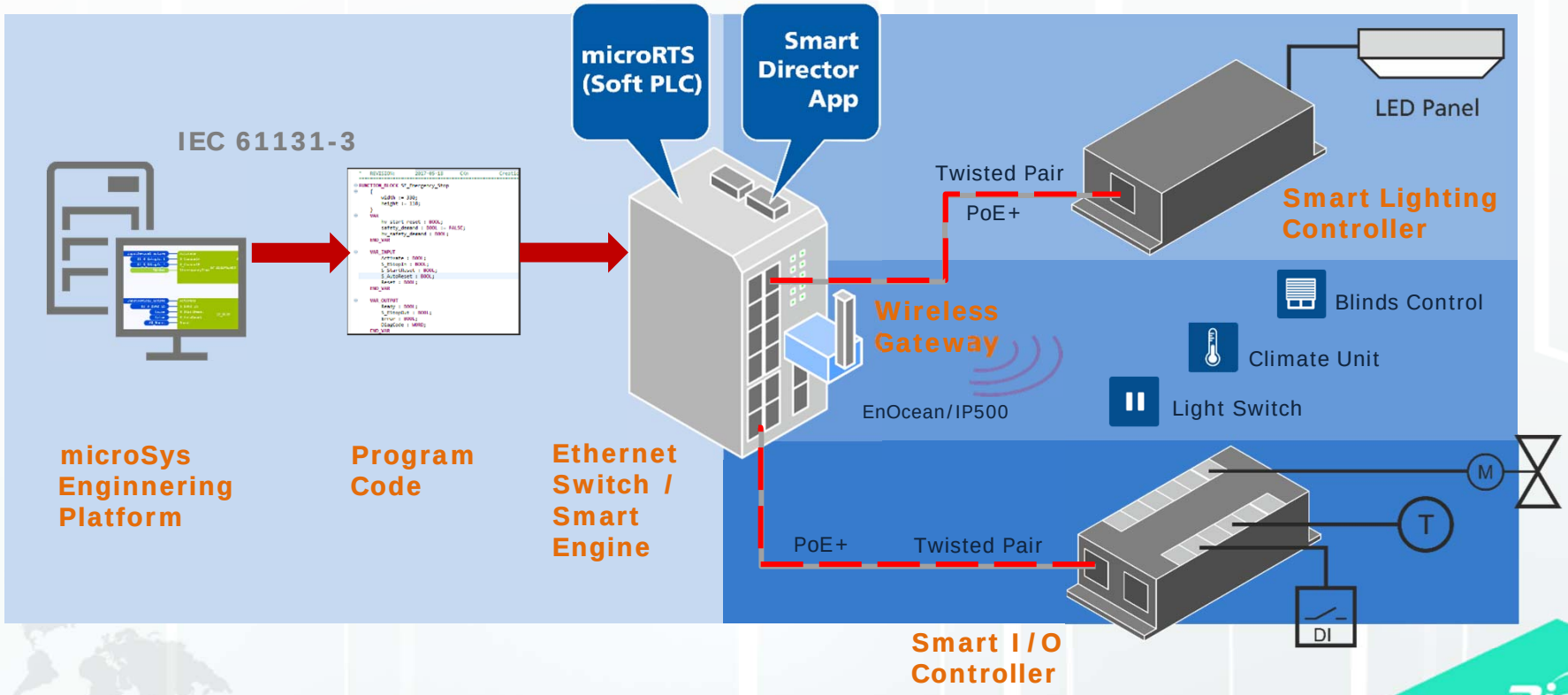
Smart Office System

System Overview



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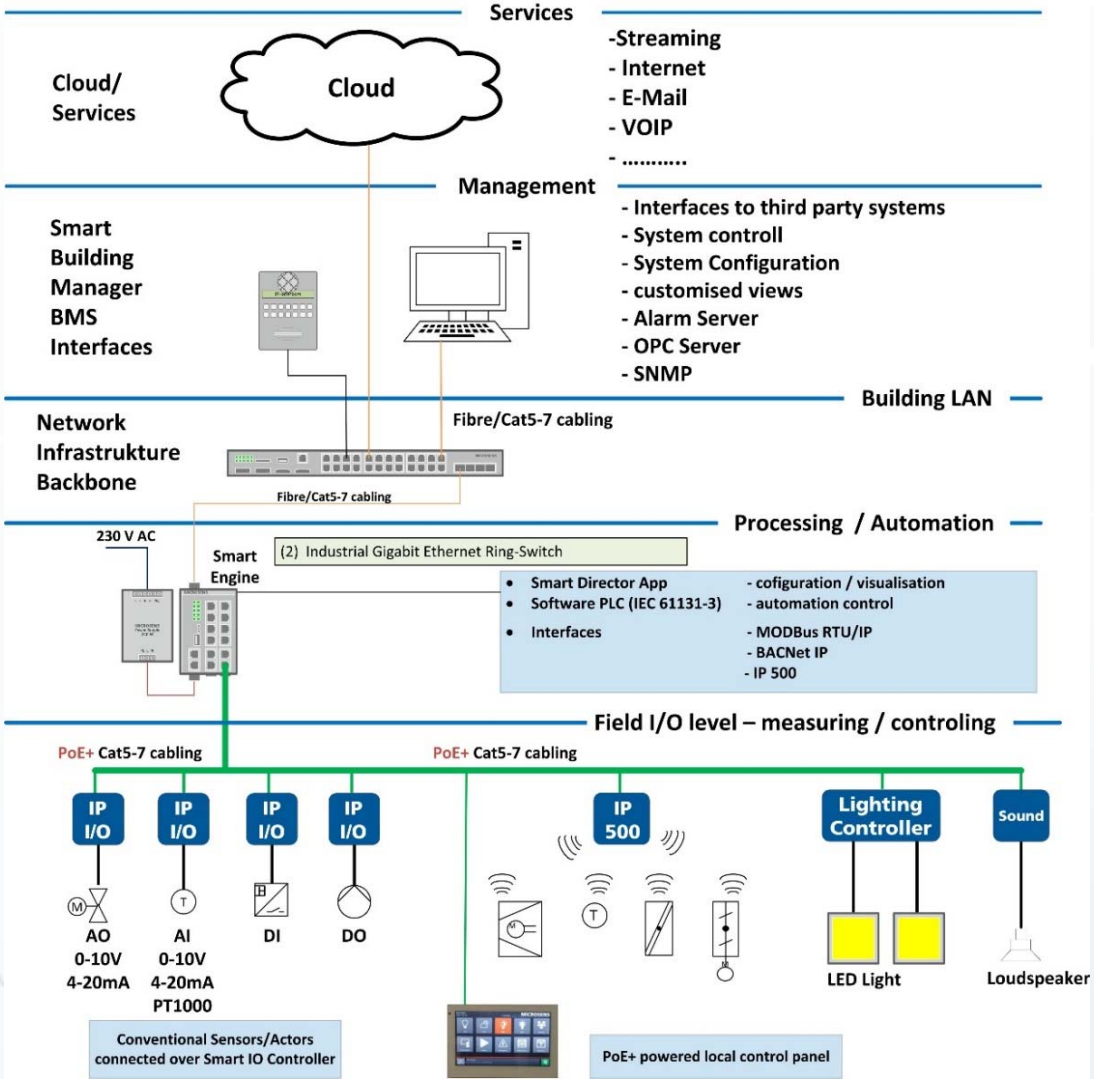
Smart Building Solution



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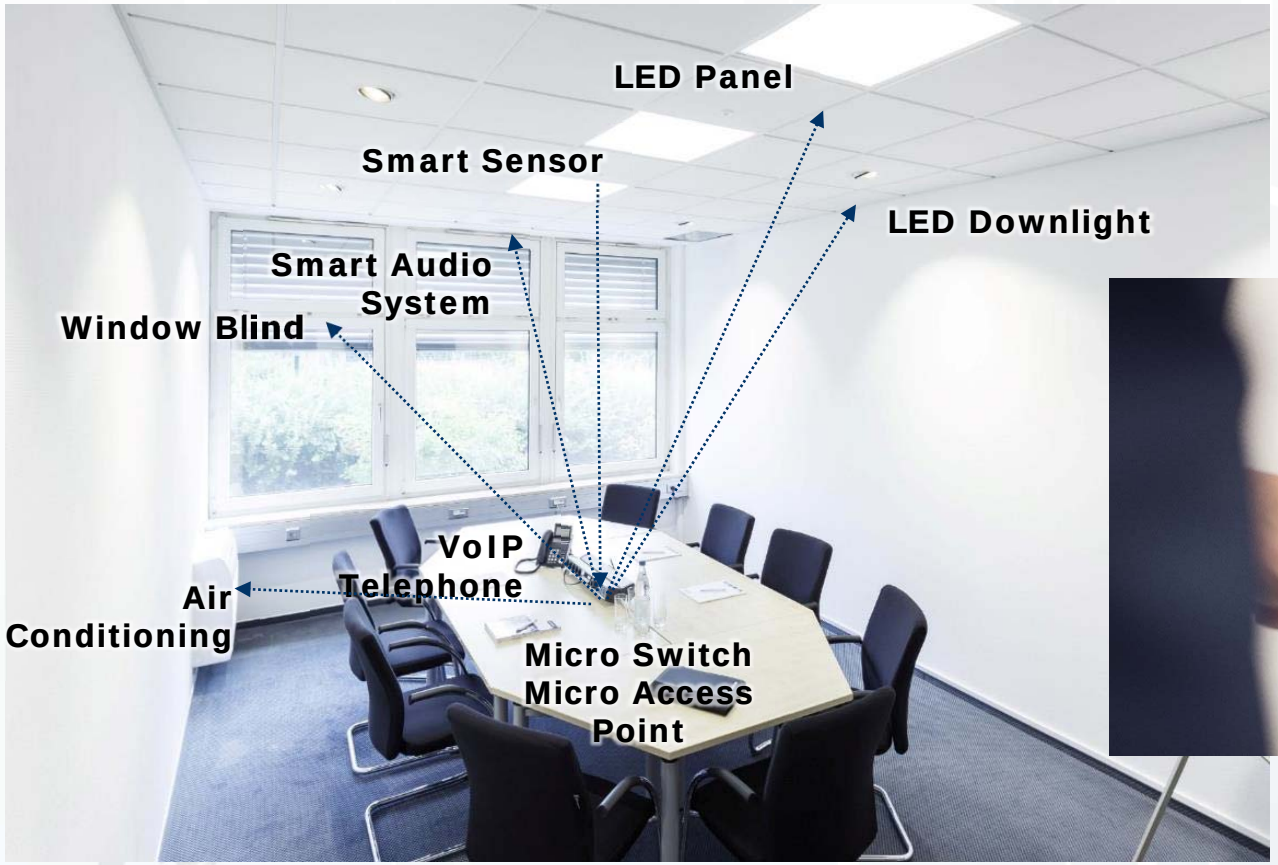
Smart Office System



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Advantages of Smart Building
with example of the flexible Smart Office Concept

- Work place is assigned to the user dynamically
- Network access and user specific functions are activated

Economic Efficiency

- Energy savings: Lighting, Heating, Air Conditioning
  only active when work place is in use

Security

- IT security levels for Building Automation Systems as part of IP technology
  include secured transmission protocols & port based security

Flexibility and Comfort

- Individual configuration of the work place by the user
- Dynamic creating of user groups

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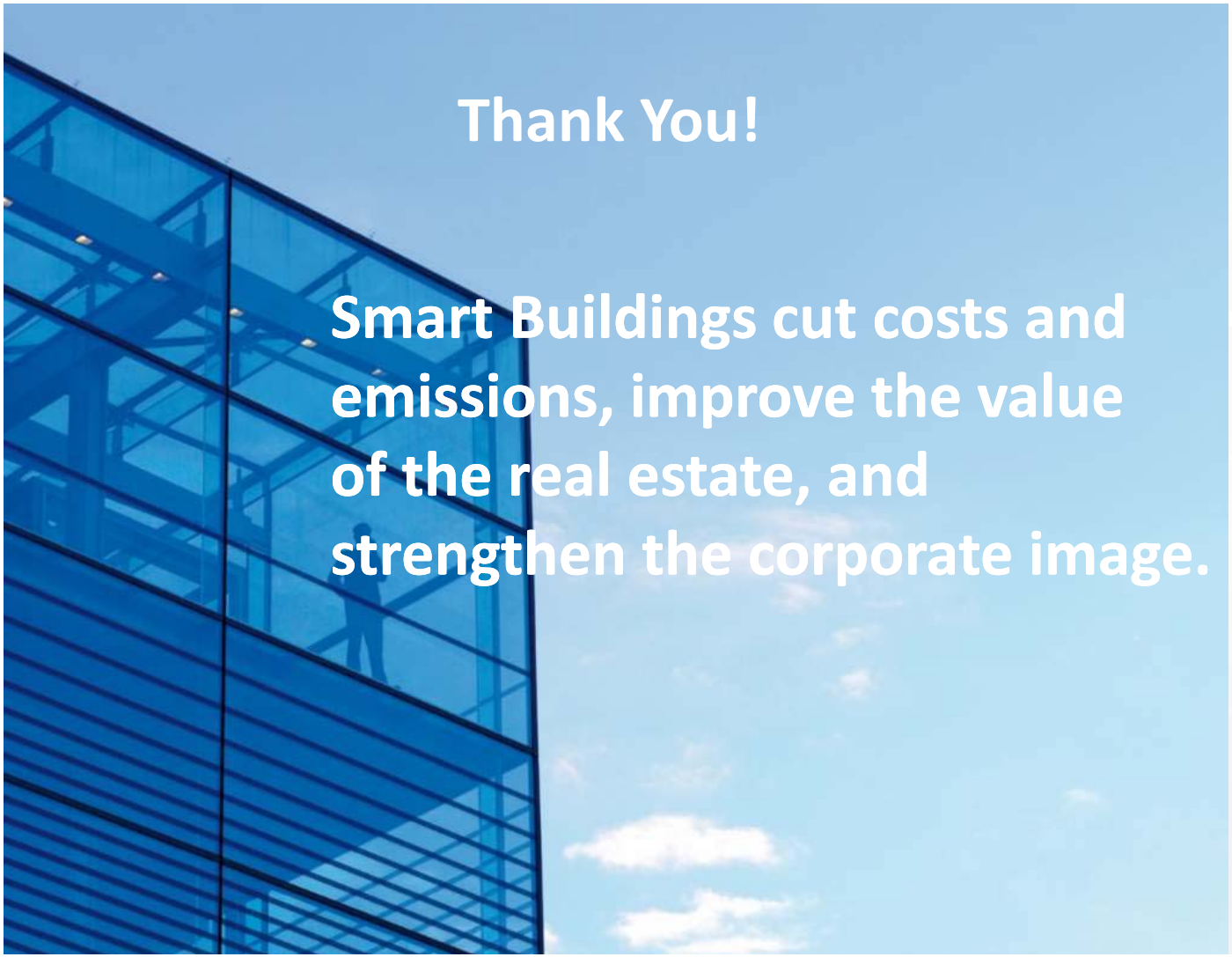

Thank You!

Smart Buildings cut costs and emissions, improve the value of the real estate, and strengthen the corporate image.

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