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Smart Room Control

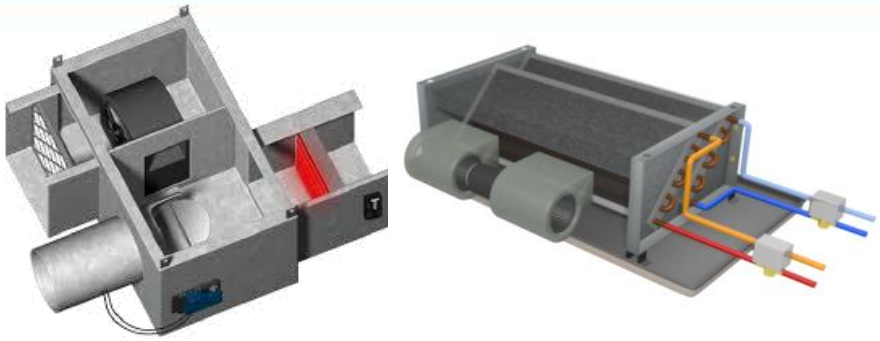
Proceedings of the 14th International Conference for Enhanced Building Operations, Beijing, China, September

Agenda

- Room Control fundamentals and evolution
- Challenges
- The Smart Room Control approach
- Benefits
- Market applications
- Typical Configurations
- Summary

Room Control – System Fundamentals

- HVAC
  - Terminal units
  - Temperature and air flow control
    - Pneumatic, electric, digital
  - Comfort and energy focus



- Lighting
  - Direct, indirect and task lighting
  - Lighting control
    - On/off, override, sensors
  - Productivity, security and energy focus

- Roller shades / Sunblinds
  - Privacy, glare and sun shading
  - Manual, motorized, automatic control
  - Security and comfort focus

Room Control – Evolution

HVAC

- Temperature control
- Time scheduling
- Occupancy sensing / Window contact
- CO_2 Demand Controlled Ventilation

Lighting

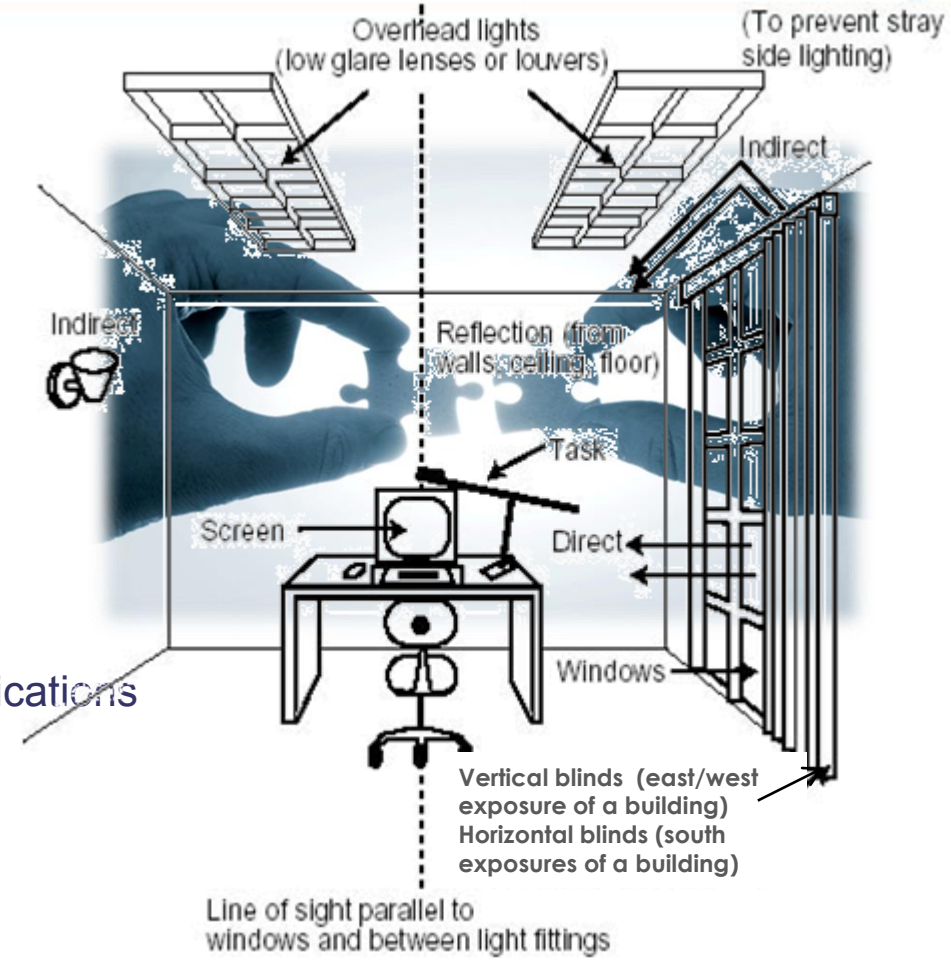
- Wall switch
- Occupancy sensor / Dimmer switch
- Circuit level control
  - On/off, 1/3 - 2/3rd switching
- Fixture control
  - Dimming, daylight harvesting

Roller Shades / Sunblinds

- Manual positioning
  - Loop chains, tilt wands
- Manual motorized control
  - Wall switch (up/down)
- Auto/Man motorized control
  - Up/down, rotate, night closure
- Optimized automatic control
  - Sun tracking for glare control
  - Daylight harvesting

Room Control - Challenges

- Complexity and interactions
  - Lighting design, control and wiring
  - Sunblind/shade integration
- Other comfort issues
  - Air distribution
    - Diffuser dumping, return air
- Duplication of control devices
  - Sensors, controllers
- Standalone HVAC, Light and Blind applications
  - Overlapping control strategies
  - Missed opportunities for energy savings
- Lack of personal control



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The Solution?

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Smart Room Control

- **End-to-end system** for the control of HVAC room terminal equipment, Lighting and Shades/Sunblinds
- Leveraging common devices and an integrated application
- Easy integration to BMS

From HVAC Control…

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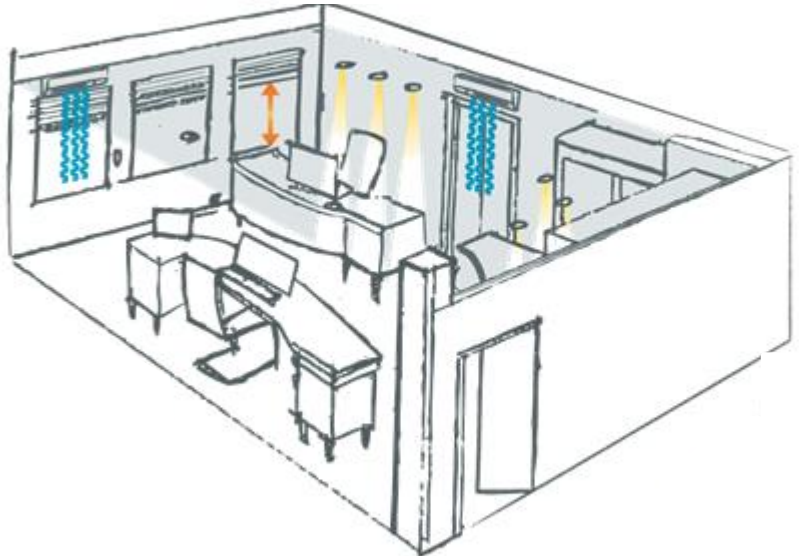
… to Smart Room Control

HVAC



Mobile App

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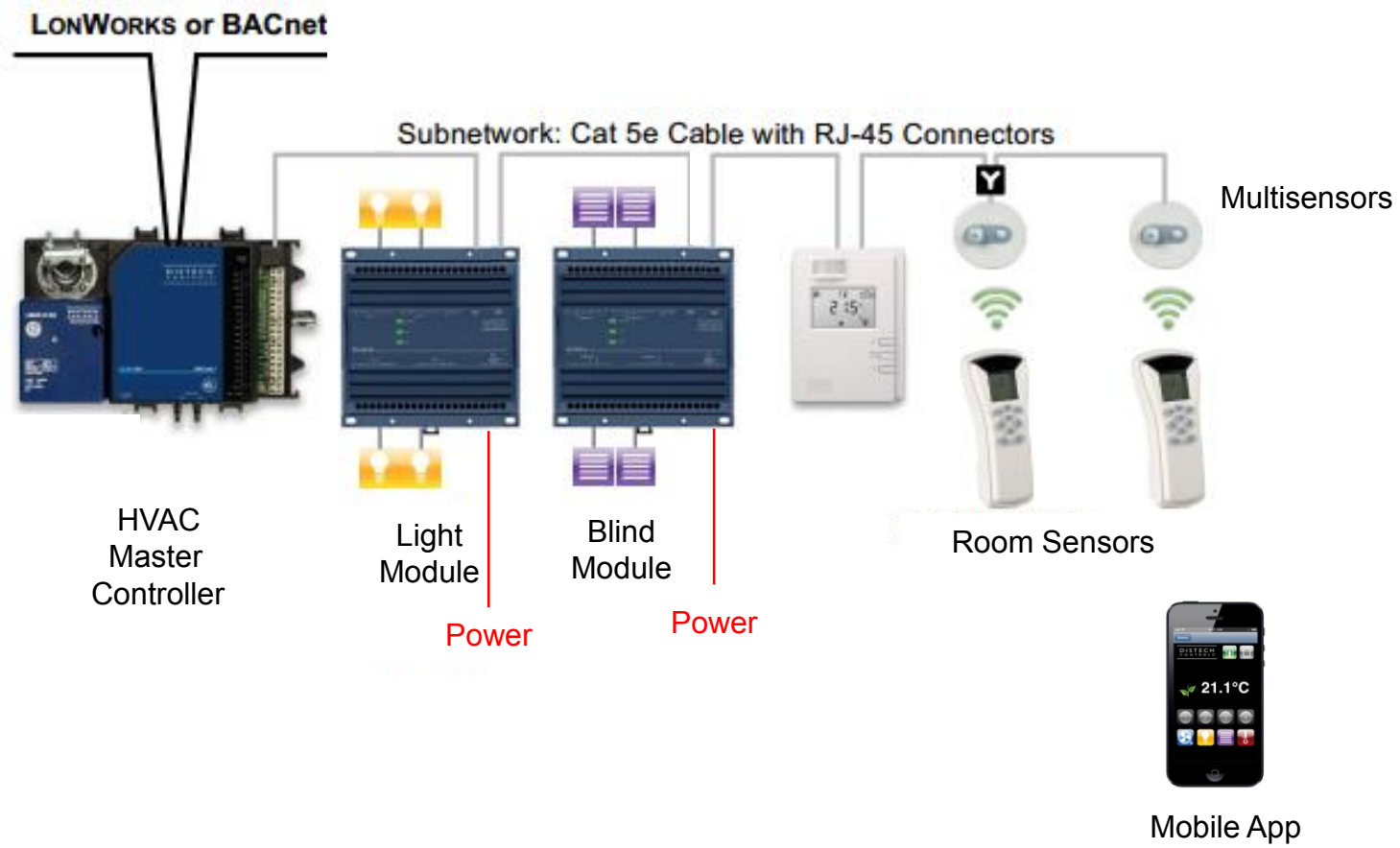
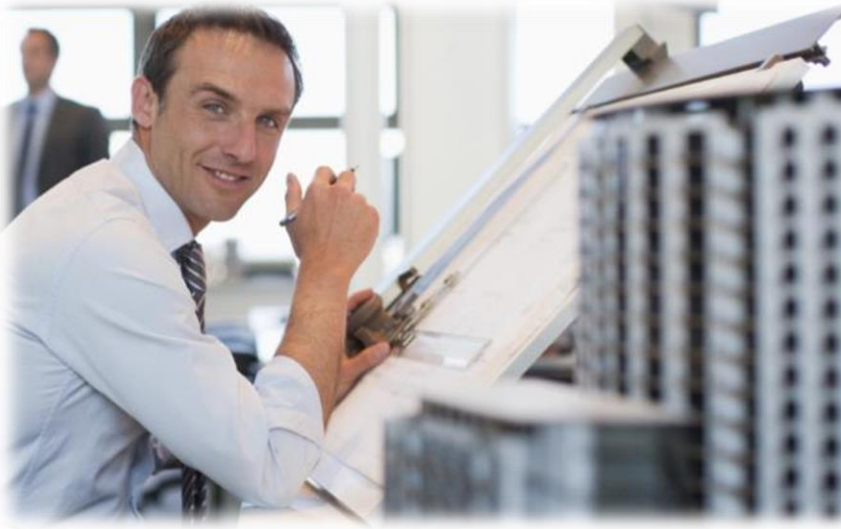
Smart Room Control Solution Architecture Example



An End-to-End Solution

- Simplified design, installation and integration of integrated room control solutions
- Increased reliability of integrated systems
- Simplified architecture = simpler design, installation and commissioning



Lower Total Installed Cost

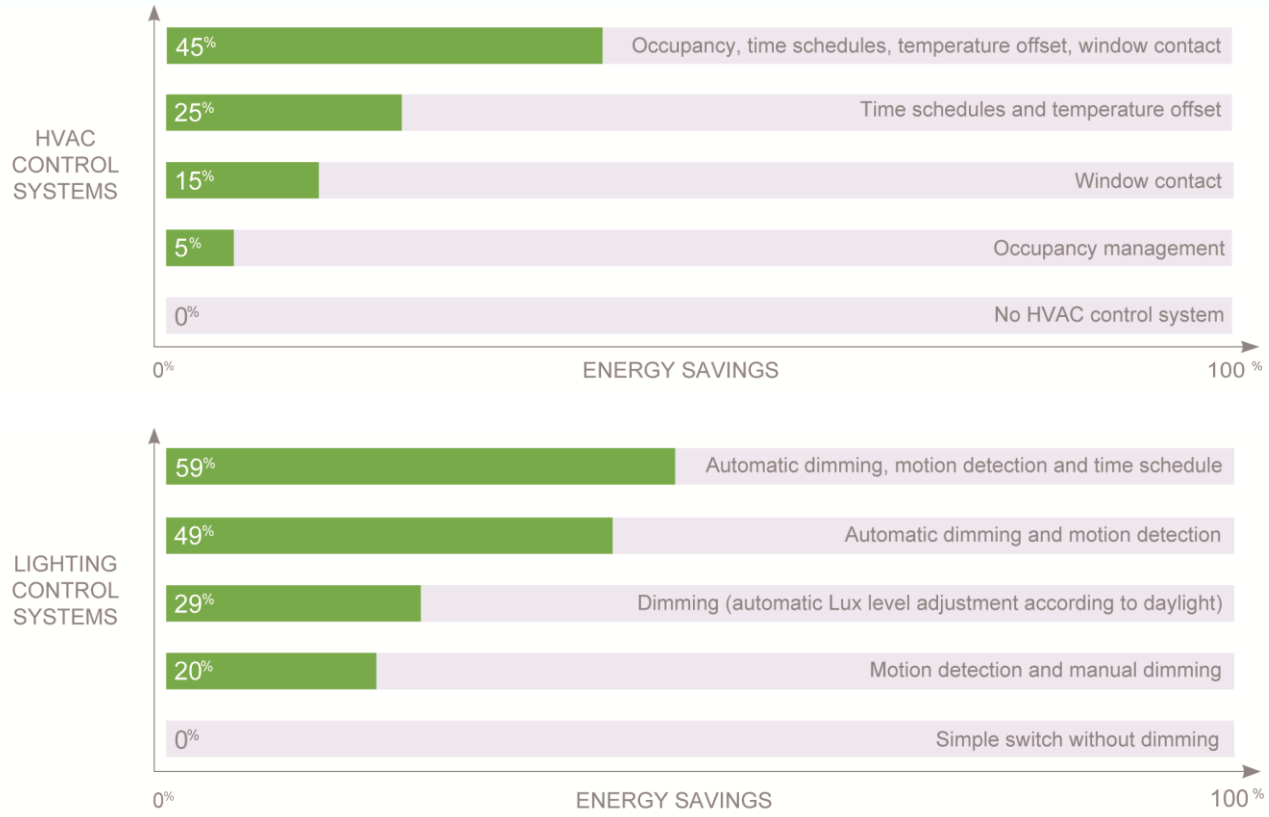
- Expansion modules for lighting and shade/sunblind control are connected to the primary HVAC controller on a sub-network
  - Installed near the equipment they control
  - Reduced wiring and installation costs
  - Single integrated program
- Expansion modules do not require additional nodes on the LON or BACnet networks
- Optimal performance with only one sensor to install and configure
  - Motion and luminosity sensing information are shared across all 3 functions

Advanced Integrated Control → Energy Savings

- Integrated solution designed to deliver optimal energy savings
  - Occupancy-based control strategies
  - Daylight harvesting based on light level sensing
  - Natural light optimization
  - Scene control
- Automation of shades/sunblinds
  - Automatic glare reduction
  - Reduces solar gain
  - Integration with scene control
- Energy savings in excess of 30% on HVAC and up to 60% on lighting possible*

* Hannover University of Applied Sciences and Arts study

Energy Savings Demonstrated



*Source : Hannover University of Applied Sciences and Arts

Increased Occupant Comfort

- Occupants can adjust temperature, lighting and shade/sunblind settings in the room
  - Achieve a level of personalized comfort
- Automation of shade/sunblind levels based on indoor and outdoor light levels
  - Automatic glare reduction
  - Benefit from increased natural light
- Variety of room devices and convenience of a Mobile App
  - LEED® Credit 6.2: Controllability of Systems—Thermal Comfort

Personal Control Device Options: Wall-mount, Remote or Mobile App

- View and control comfort parameters
  - Temperature, fan speed, lighting, shades/sunblinds and occupancy
- Occupant-defined “scenes”
  - Preferred settings
- Can be used to command several rooms accessed by the same occupant independently.

Typical Market Applications

- Modular solution designed for room applications
  - Offices
  - Conference rooms
  - Patient rooms
  - Classrooms
  - Dorms
  - Military housing, etc.

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Typical Installations

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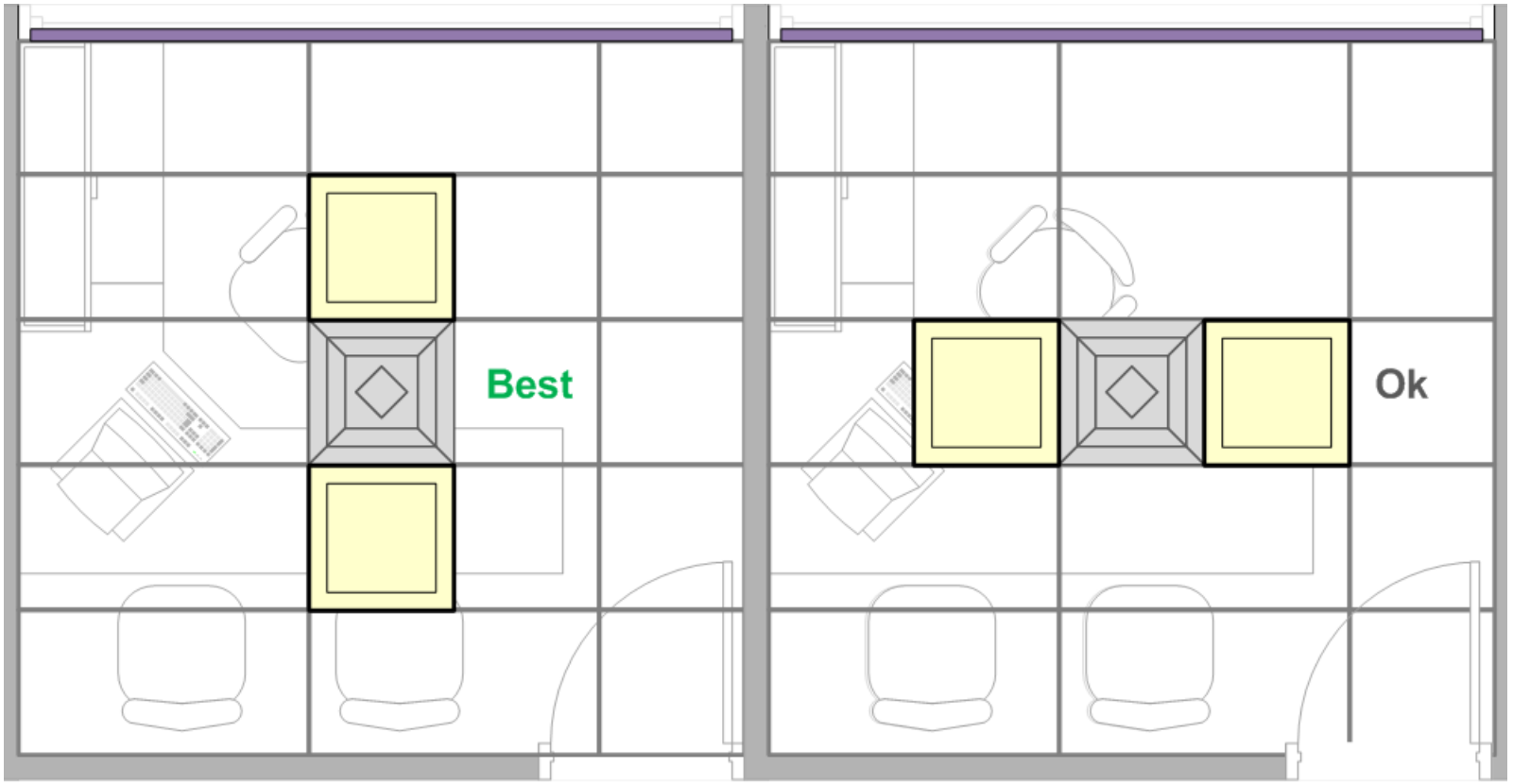
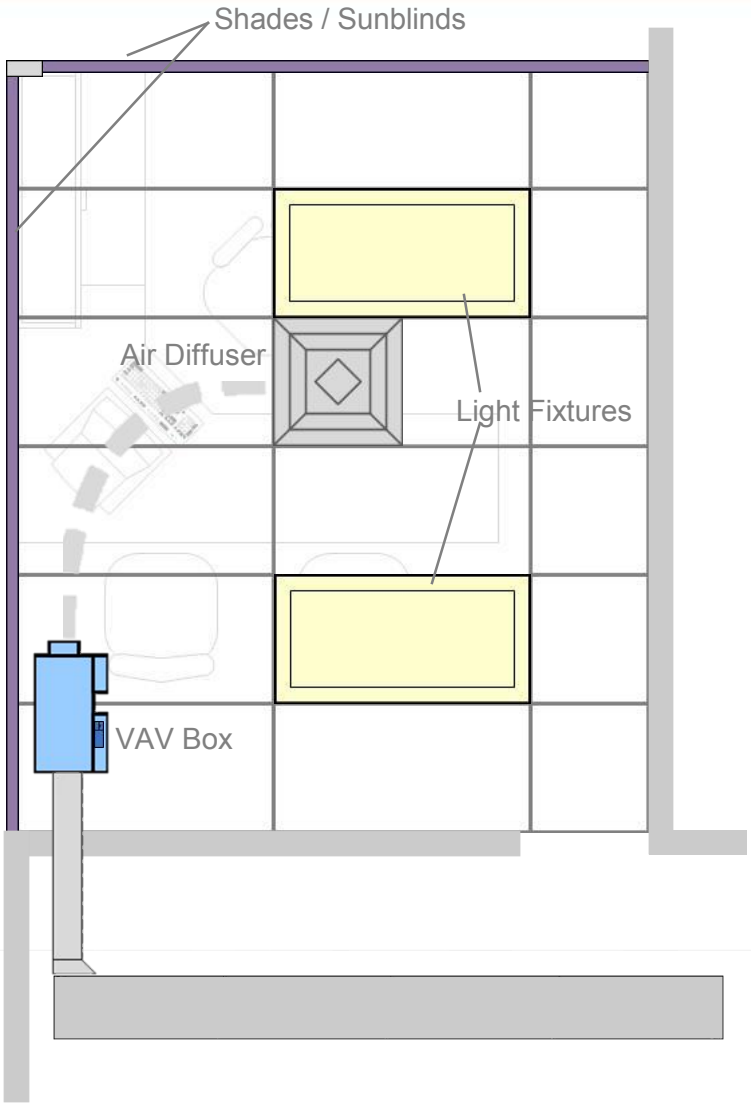
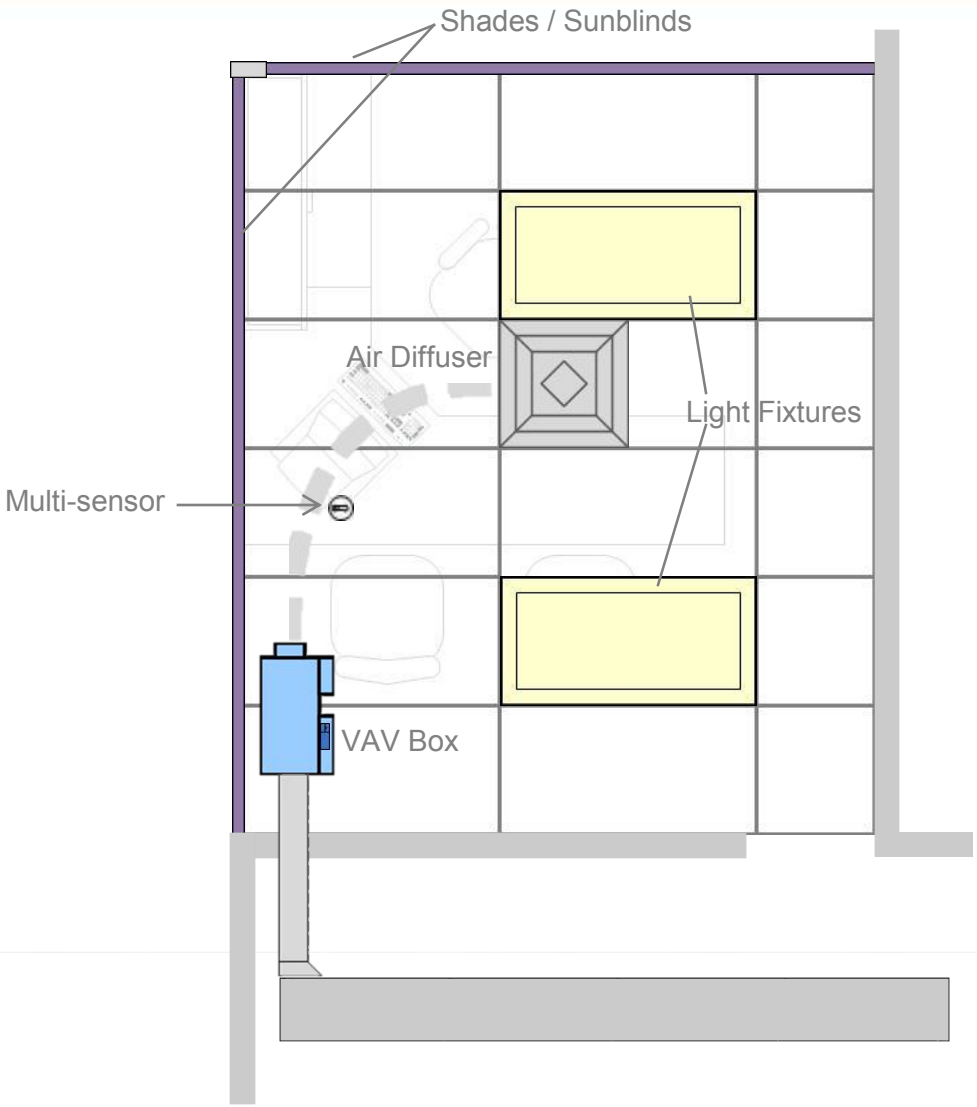
Lighting Layout Basics – Windows and Corridor



Typical Office Layout



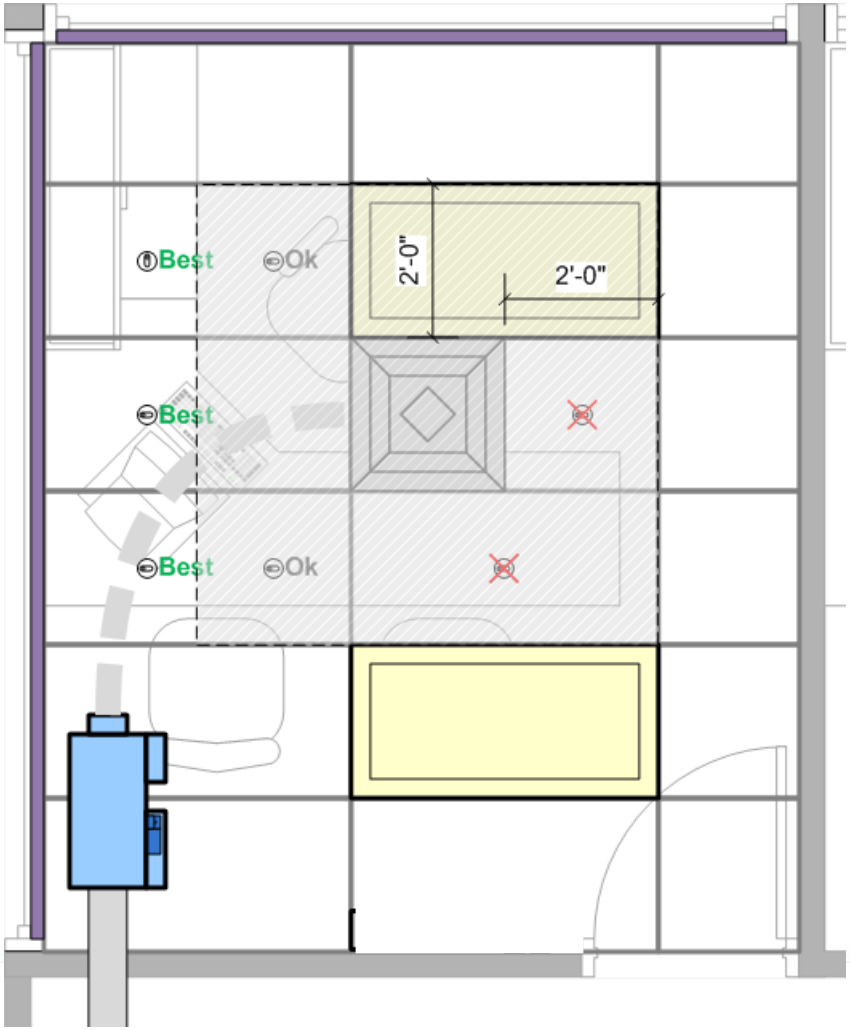
Typical Device Placement



Multi-Sensor Positioning Basics

- Ideal position:
  - Over work space
  - Over worker(s)

- Challenges
  - Equipment position
    - Light fixtures
    - Air diffusers
  - Heat
    - Hot air streams can cause false detection with PIR technology
    - Minimum of 60cm from an air diffuser. More is better.
    - Air diffusers distribute less air in diagonal direction



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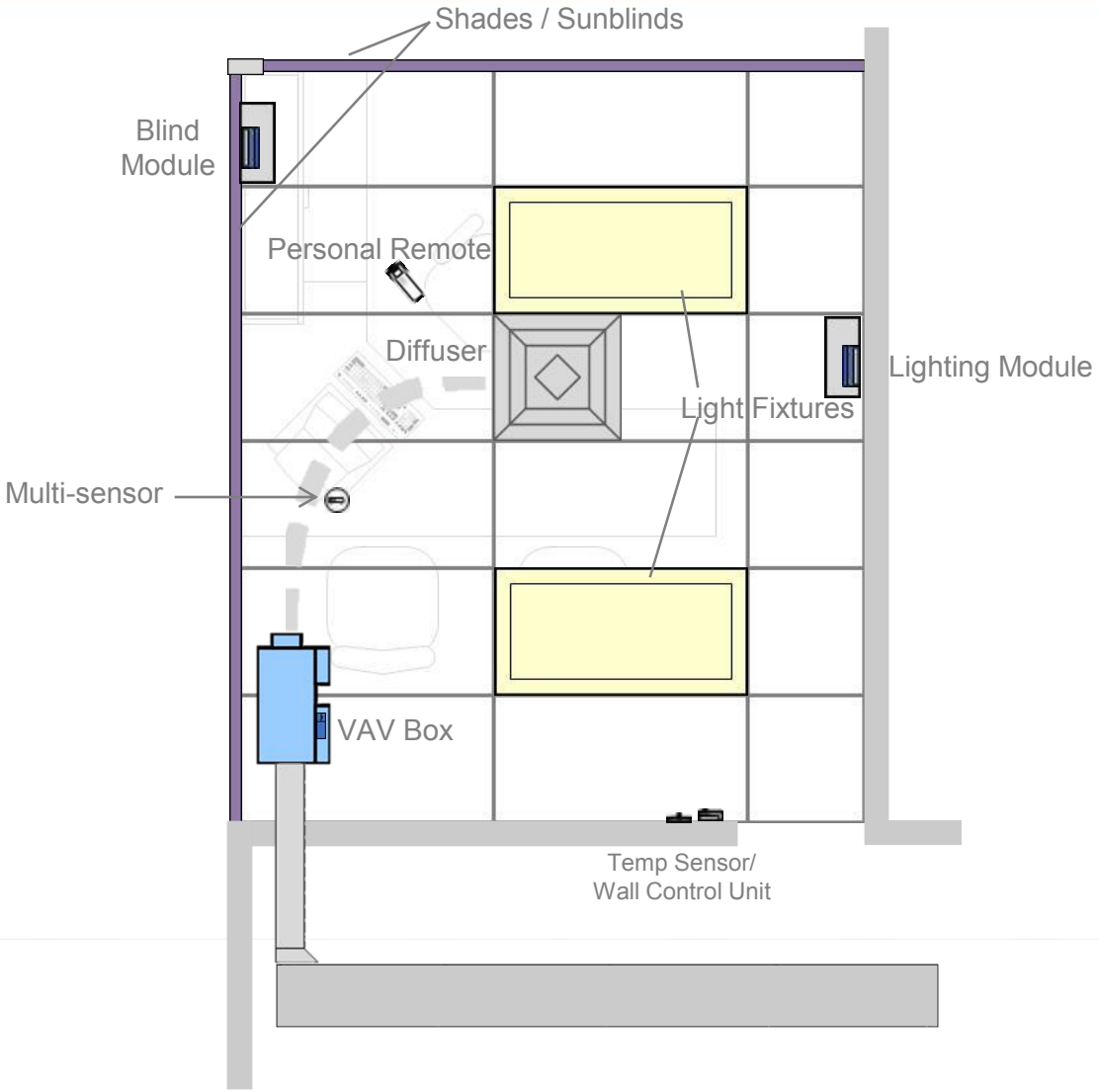
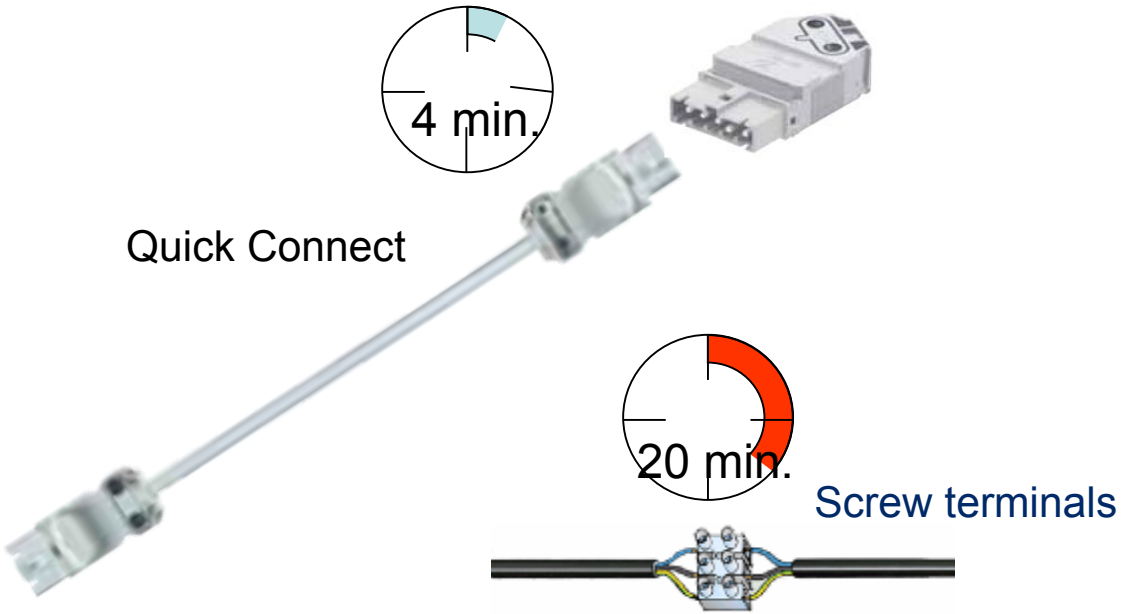


Light Fixture and Blind Motor Wiring Options

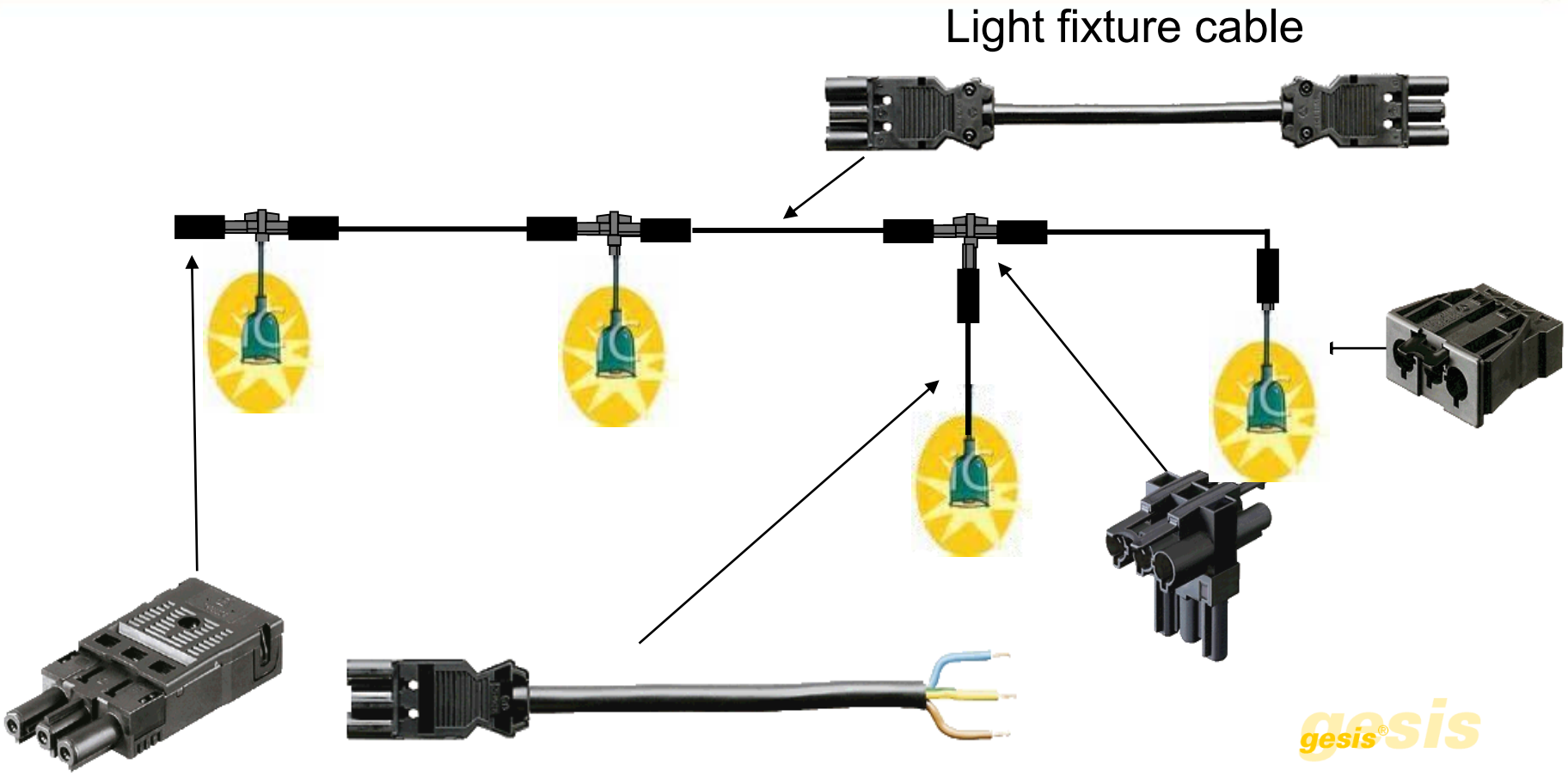


Modular connectors offered as a factory option by fixture and blind manufacturers

Use of screw terminals will require electrical protection

Check local jurisdictions for use of modular wiring

Modular Wiring example



Smart Room Control Summary

- Smart Room Control provides an end-to-end solution for offices
  - HVAC, Lighting and Sunshades / Sunblinds
- Perfect fit for new construction and tenant fit-outs
  - Leverages modular components and delivers installation savings
- Benefits delivered
  - Increased comfort
  - Personalized control
  - Enhanced employee satisfaction
  - Energy savings
- Provides LEED® credits
- Proven concept with hundreds of thousands of room systems installed

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Thank you

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Questions?

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