Daylight Autonomy Made Real
Daylight Autonomy?

“...% of work hours where the design illuminance is completely achieved through daylight...”
Why Daylight?
Energy Saving
• Productivity
Achieving a Balance
<table>
<thead>
<tr>
<th></th>
<th>Openness Factor (OF)</th>
<th>Visible Transmittance (Tv)</th>
<th>Solar Reflectance (Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Glare</strong></td>
<td>![Down Arrow]</td>
<td>![Down Arrow]</td>
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<td><strong>Daylighting</strong></td>
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<td>![Up Arrow]</td>
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<td><strong>Views</strong></td>
<td>![Up Arrow]</td>
<td>![Down Arrow]</td>
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<td><strong>Solar Heat</strong></td>
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<td>![Up Arrow]</td>
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Daylight Drawbacks
Glare
In Real Terms:

Assume £40/hr salary/overhead/costs

£10 reduction / employee / hour

£30 per window-bay / hour

For every 100 hours = £3k lost productivity
But even 10%...
Thermal Gain
Manual or Automatic Shading
Manual Shades
10-20%
45-75%

55-85%
Typical Passive Systems
Tinted Windows

5%  15%  20%  30%  35%  50%  No Tint
Good for: worst case

Bad for: rest of the time!
Benefits of Passive Systems

- Gets rid of a higher % of heat-gain
- Simplicity
- Always there
Drawbacks of Passive Systems
Inconsistent View Quality
Lack of Dynamic Effect
Passives
Drawback

View
Glare
Automated Shades
Where is the sun?
User Control
Calculation
Measurement
Why measure?
Why measure?
Shanghai Skyline over the past 20 years
Sensor type: 

Roof or Window?
How many sensors?
Sensor Location?
Would you put a single light sensor outside for all your light control?
Would you put a temperature sensor outside for your heating control?
Dual Approach...
Measurement
What About Sensor Wiring?
Wireless
• Installation Costs
Scalability
Battery Life

10 YEARS
• The sun moves!
• The local “sky” landscape changes
• Mix of measurement and calculation

• Optimise for:
  – glare vs light vs solar gain vs view

• User control
• Easy Installation is Essential
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