Climate Based Daylight Modelling and the Optimisation of School Classroom Design – An Industrial View

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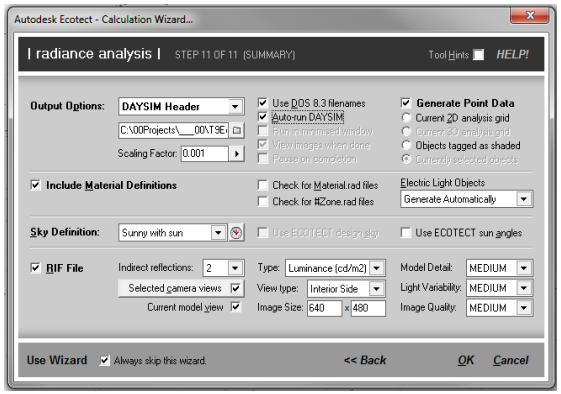
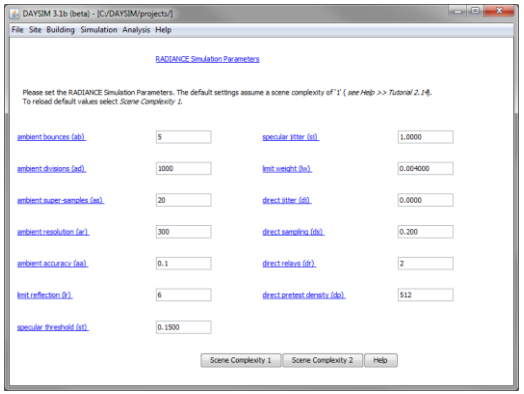
Climate Based Daylight Modelling

- Local Weather Files
- Orientation
- Direct Sunlight
- Can do more detailed analysis
- Takes into account quality & quantity

Process Development

Ecotect with Daysim





DIVA plugin for Rhino

Custom scripts to get results and help automate

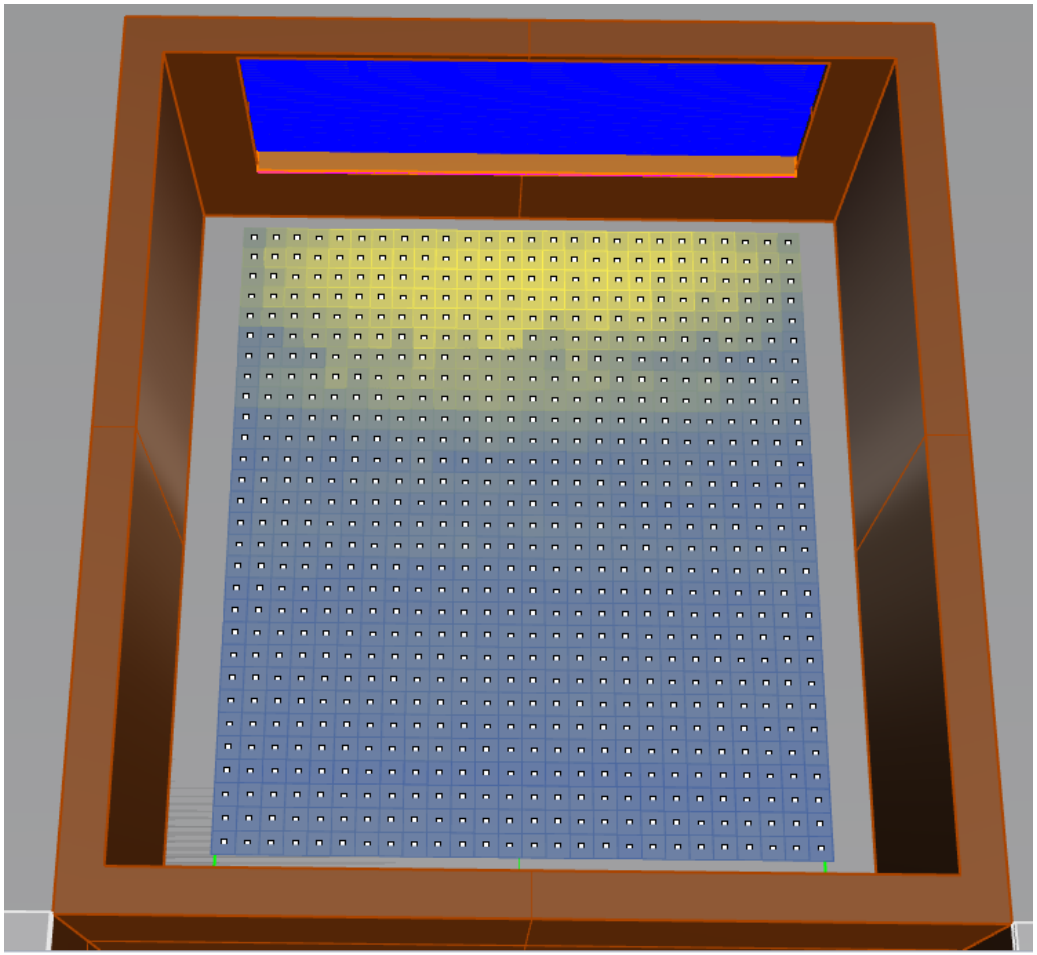
Standardised Window

- Pass CBDM metrics can then be used on all designs
- Based on 55m² classroom
- Applied to all orientations
- What to benchmark against

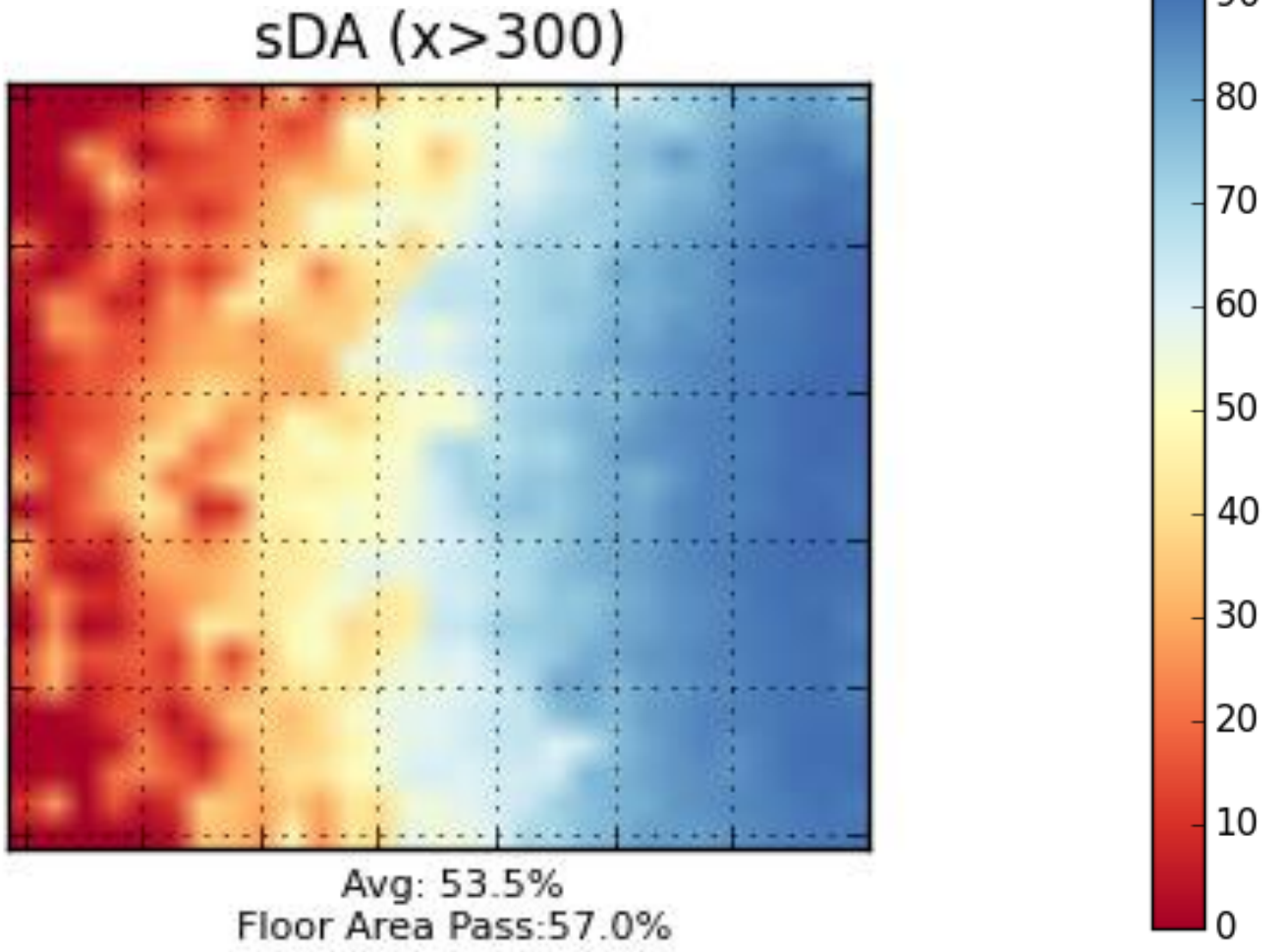
Metrics

- PSPB & FOS
- To improve quality of daylight within schools
- Sets out criteria & metrics to be met
- Daylight Autonomy
- Useful Daylight Illuminance

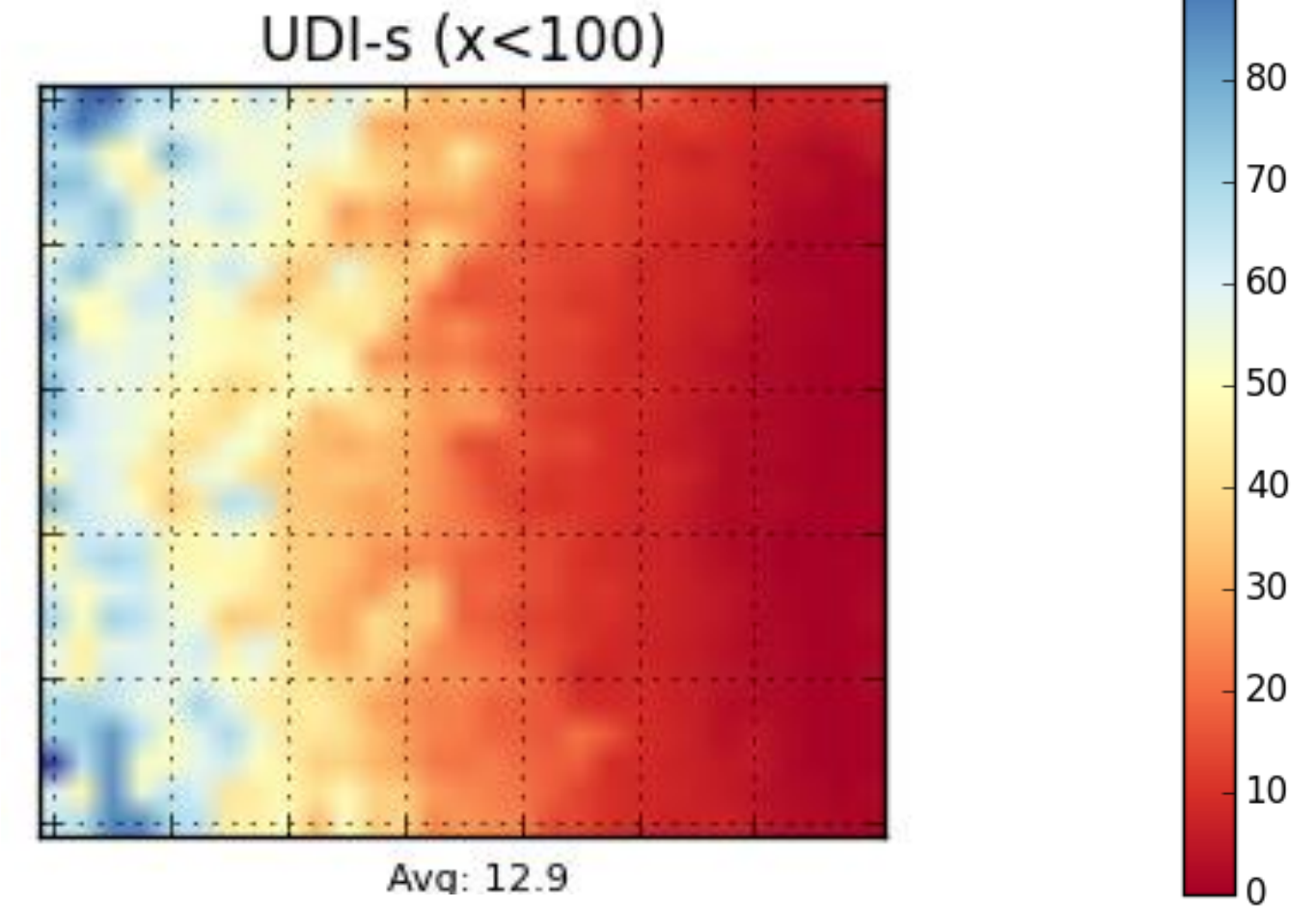
Standard Room



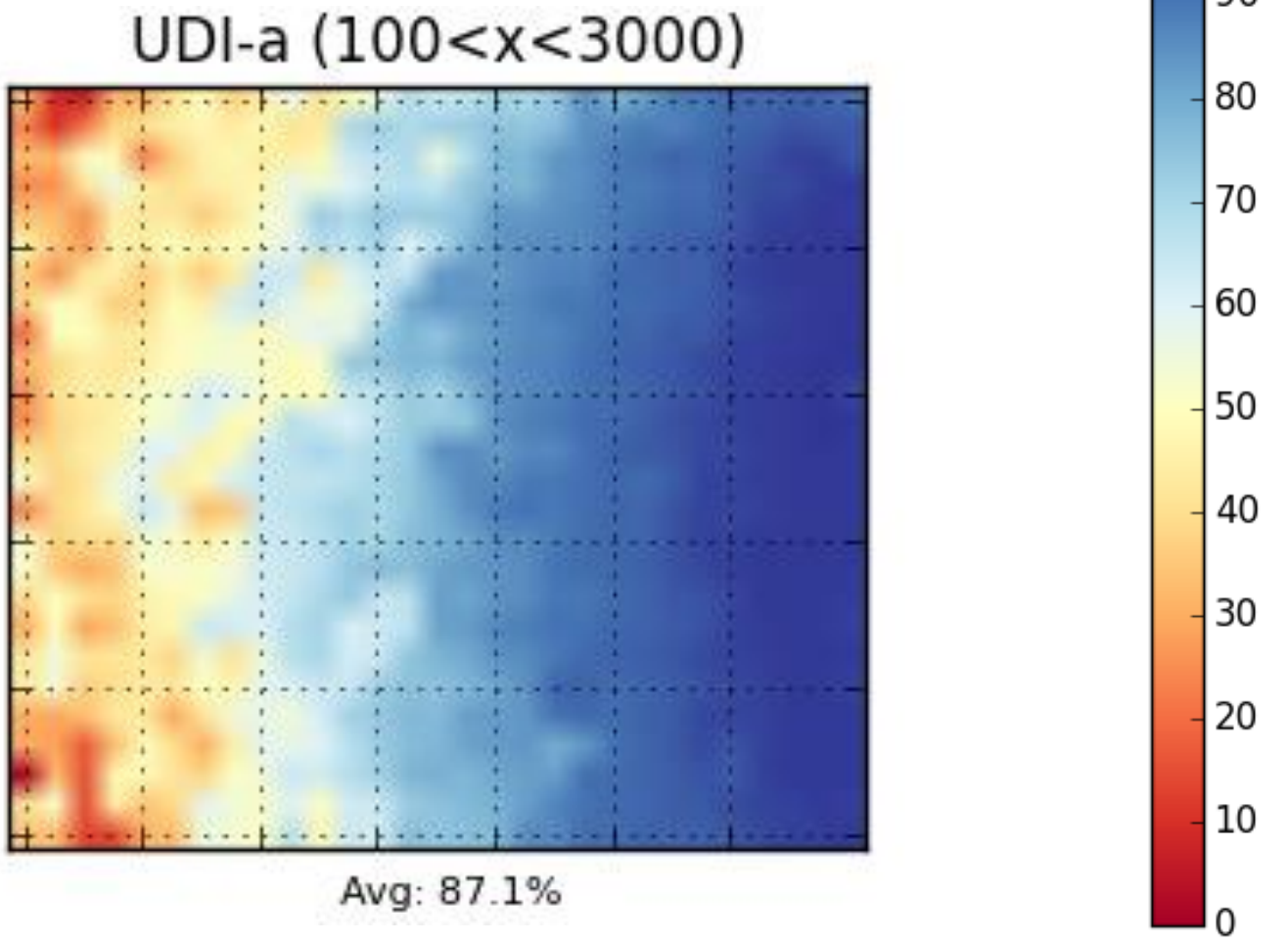
Daylight Autonomy



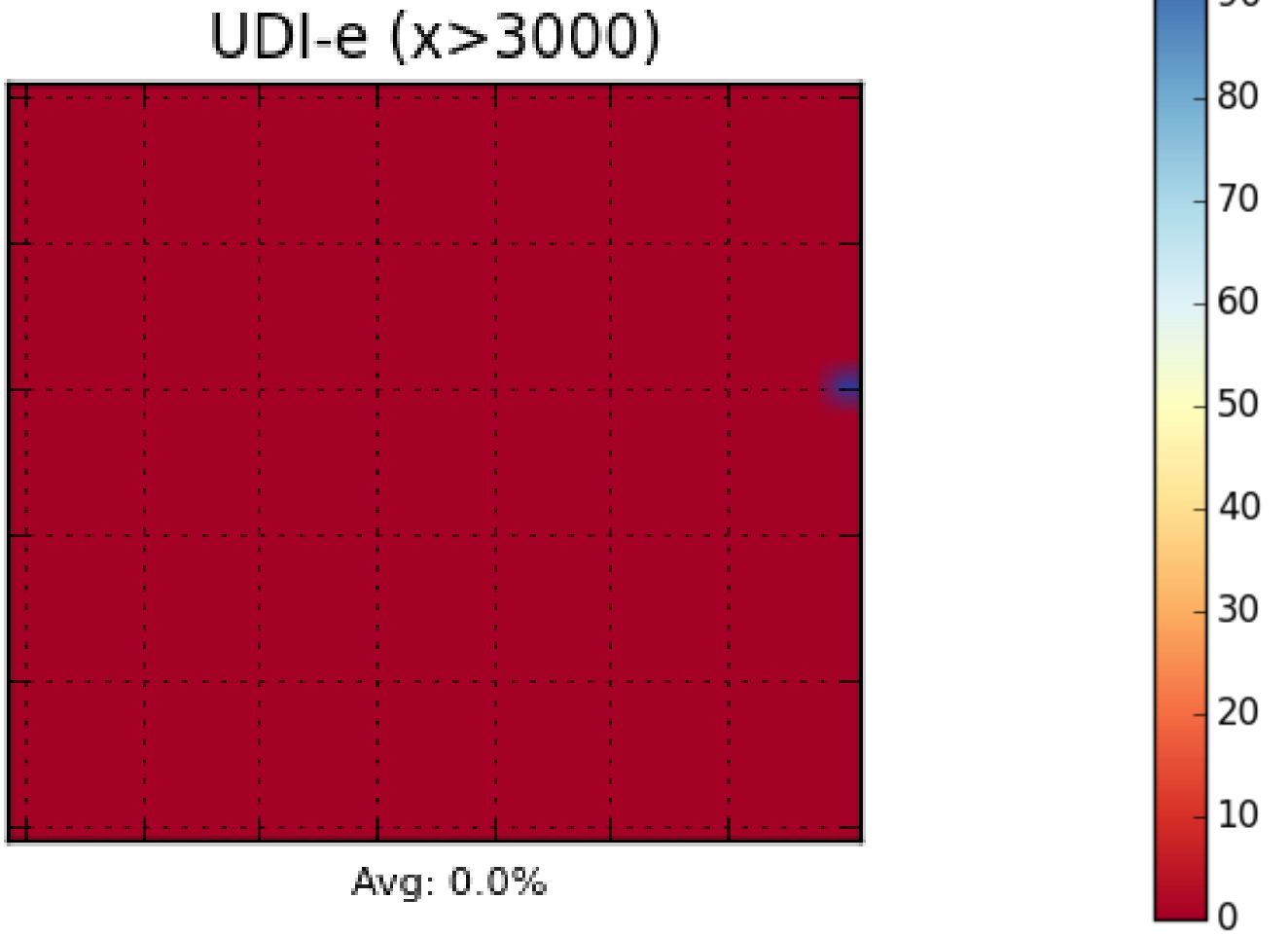
UDI Supplementary



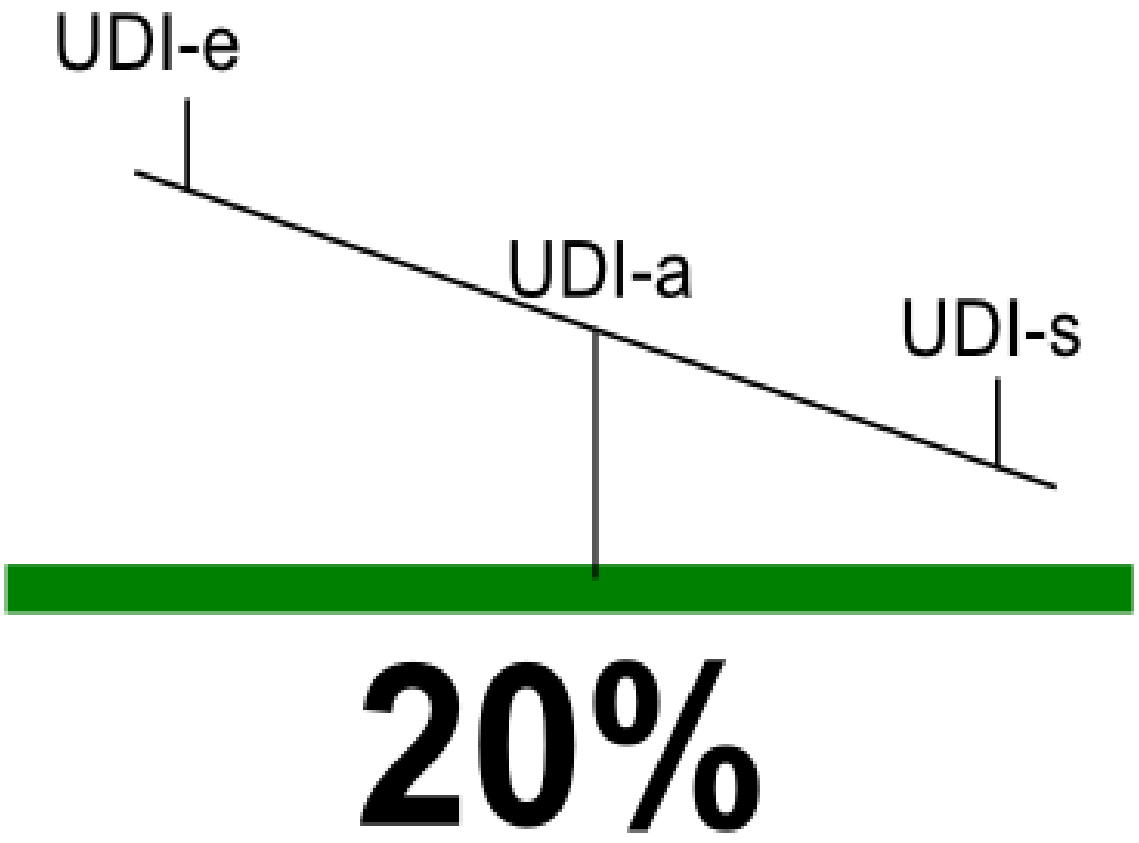
UDI Acceptable



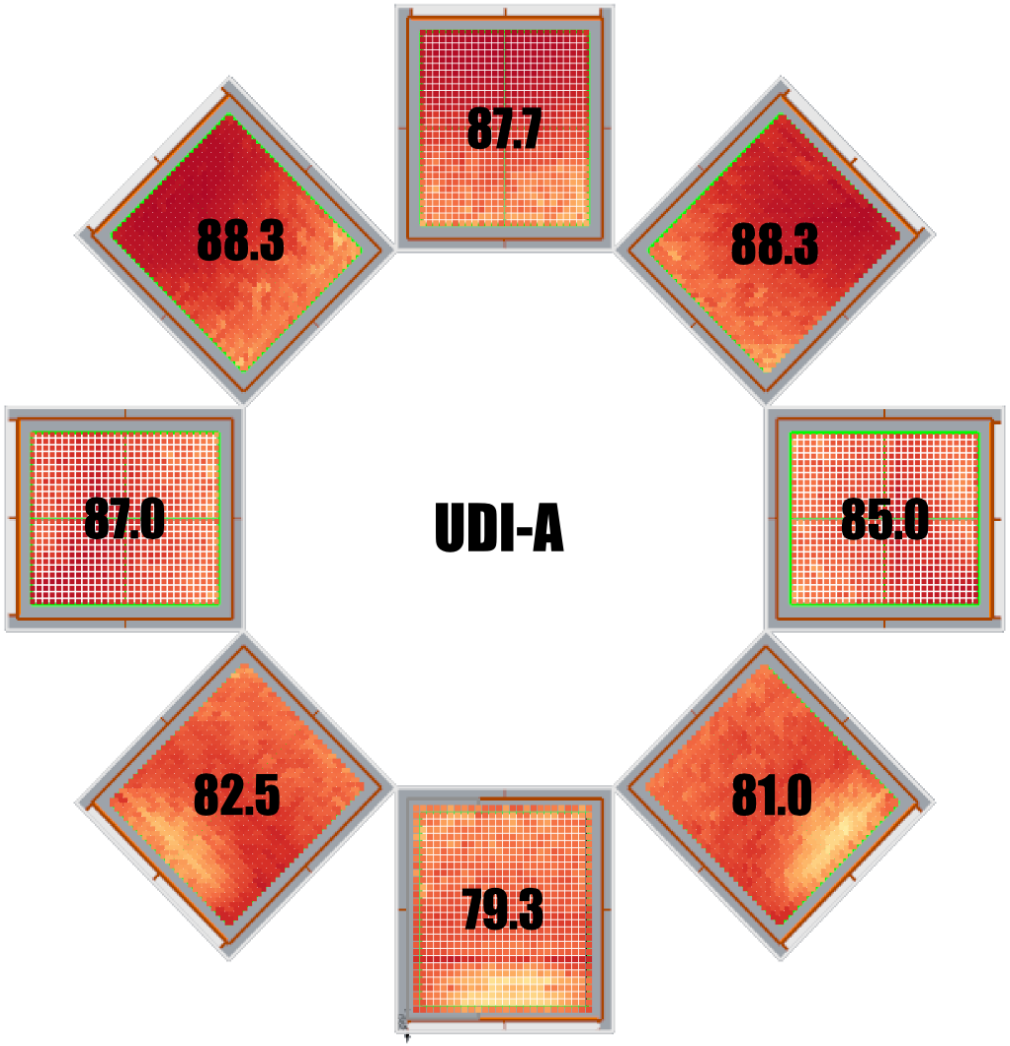
UDI Exceednance



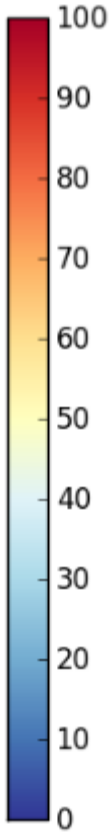
Standard Window



Orientation



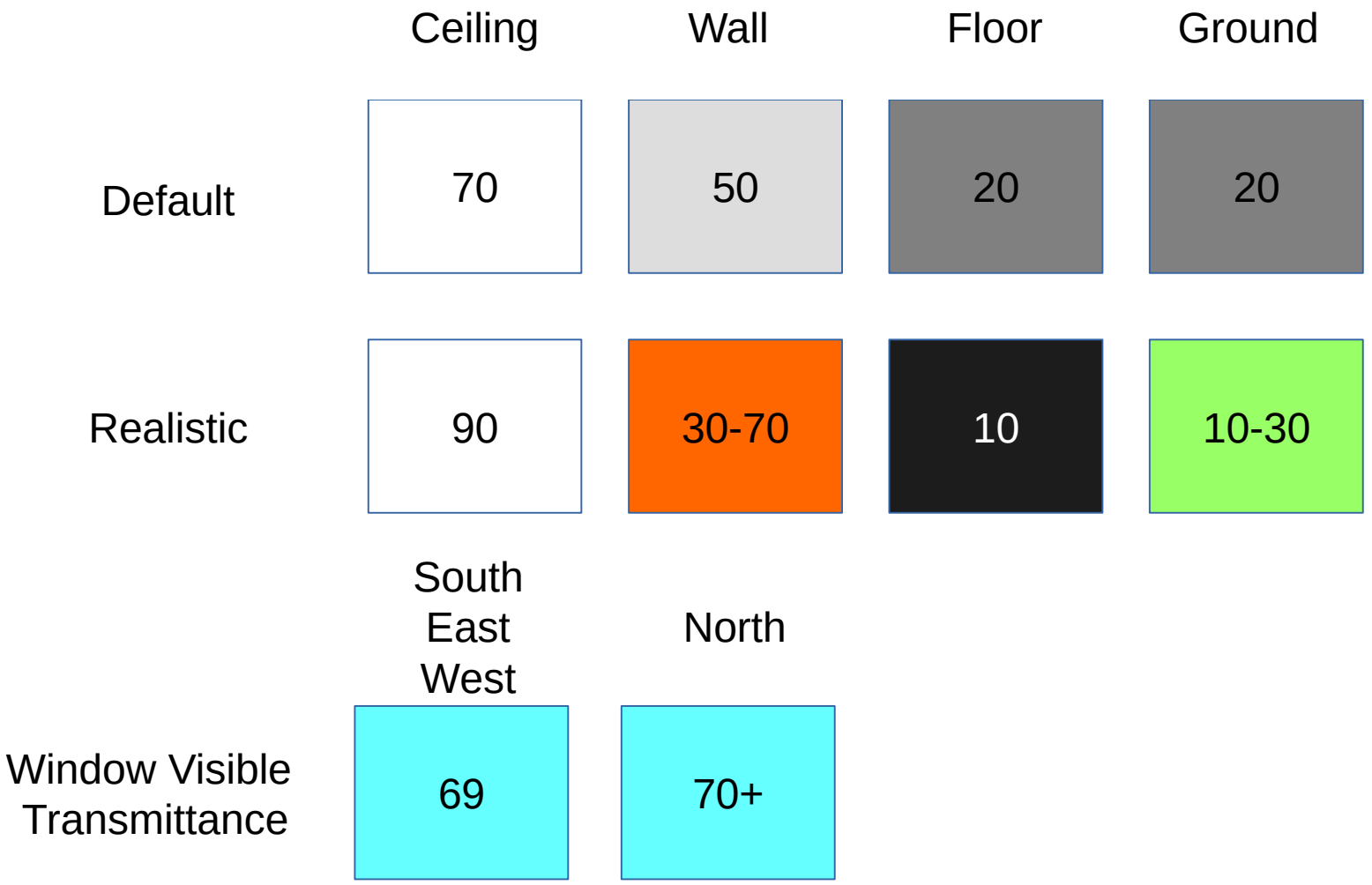
% Occupied Hours between 100 & 3000 lux



Glazing Amount

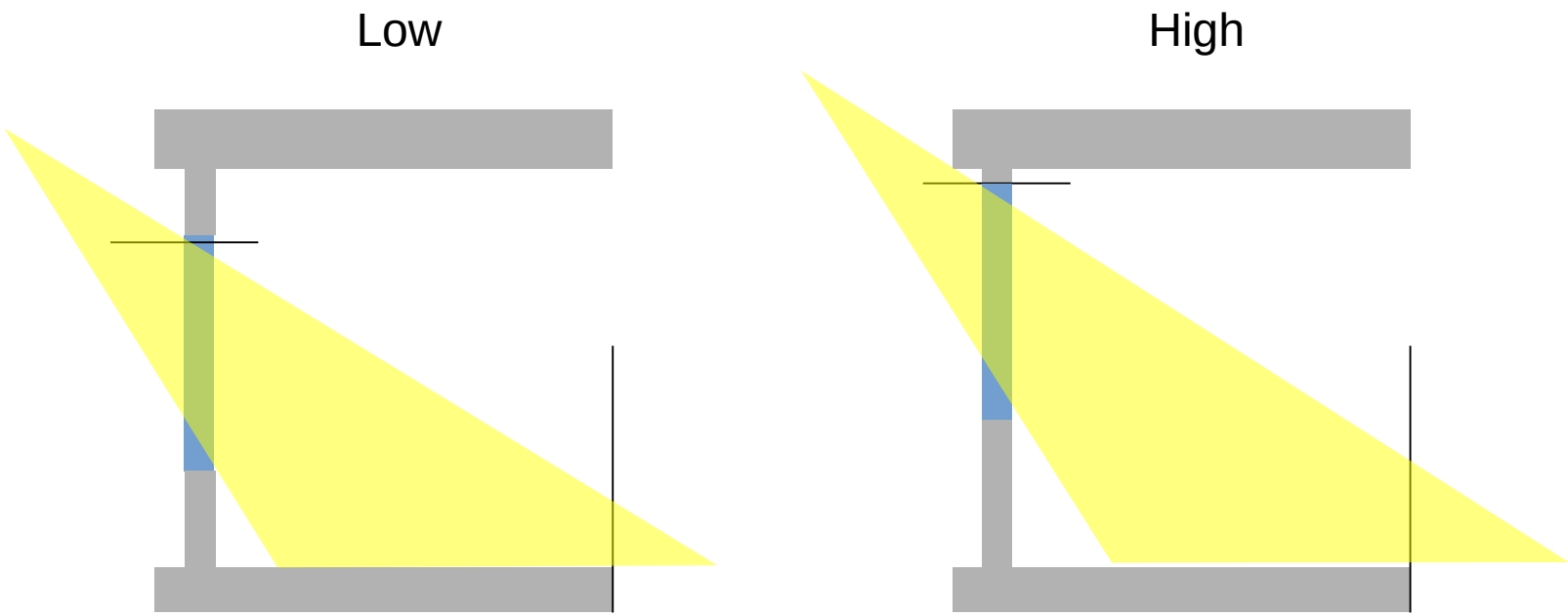
- Started off by trialling one big central window
- Found that less than 28% of glazing was needed
- Used this figure to then create a window configuration with this amount of glazing
- Visible Transmittance

Reflectances



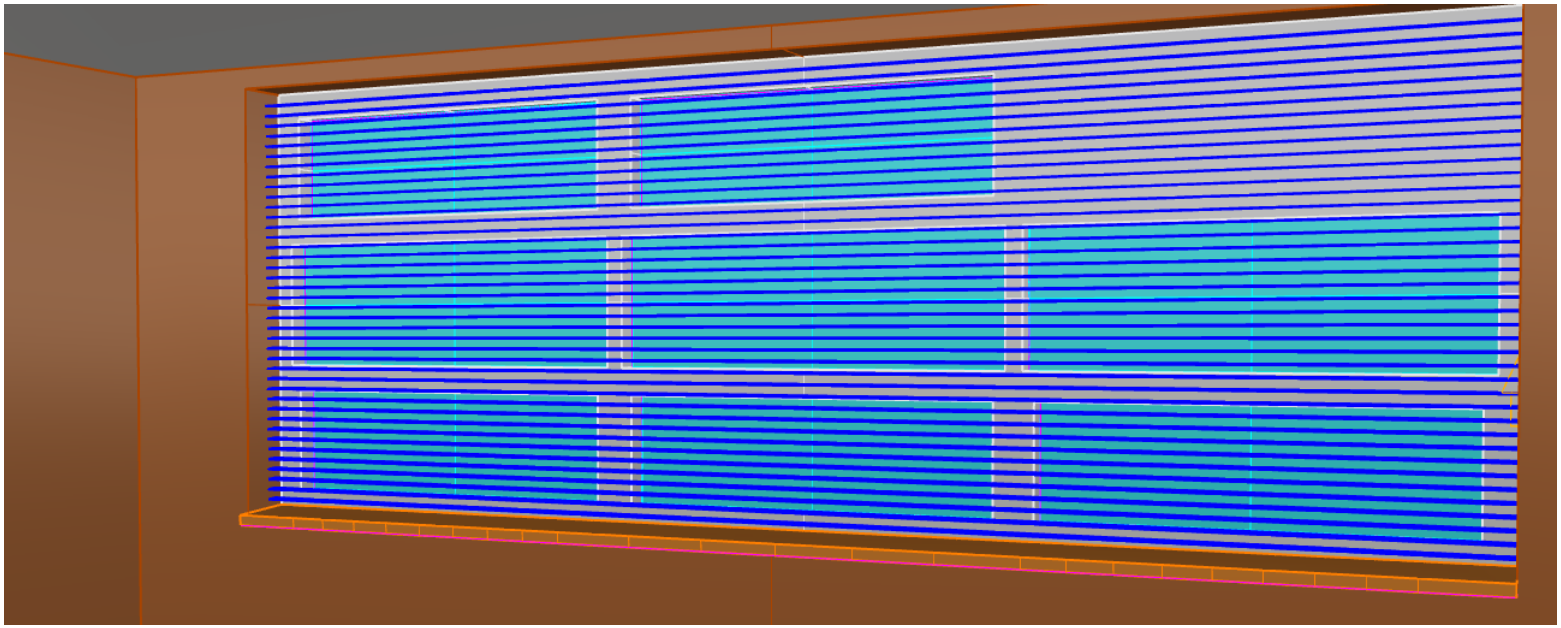
Height of Window

Window needs to be close to top of soffit

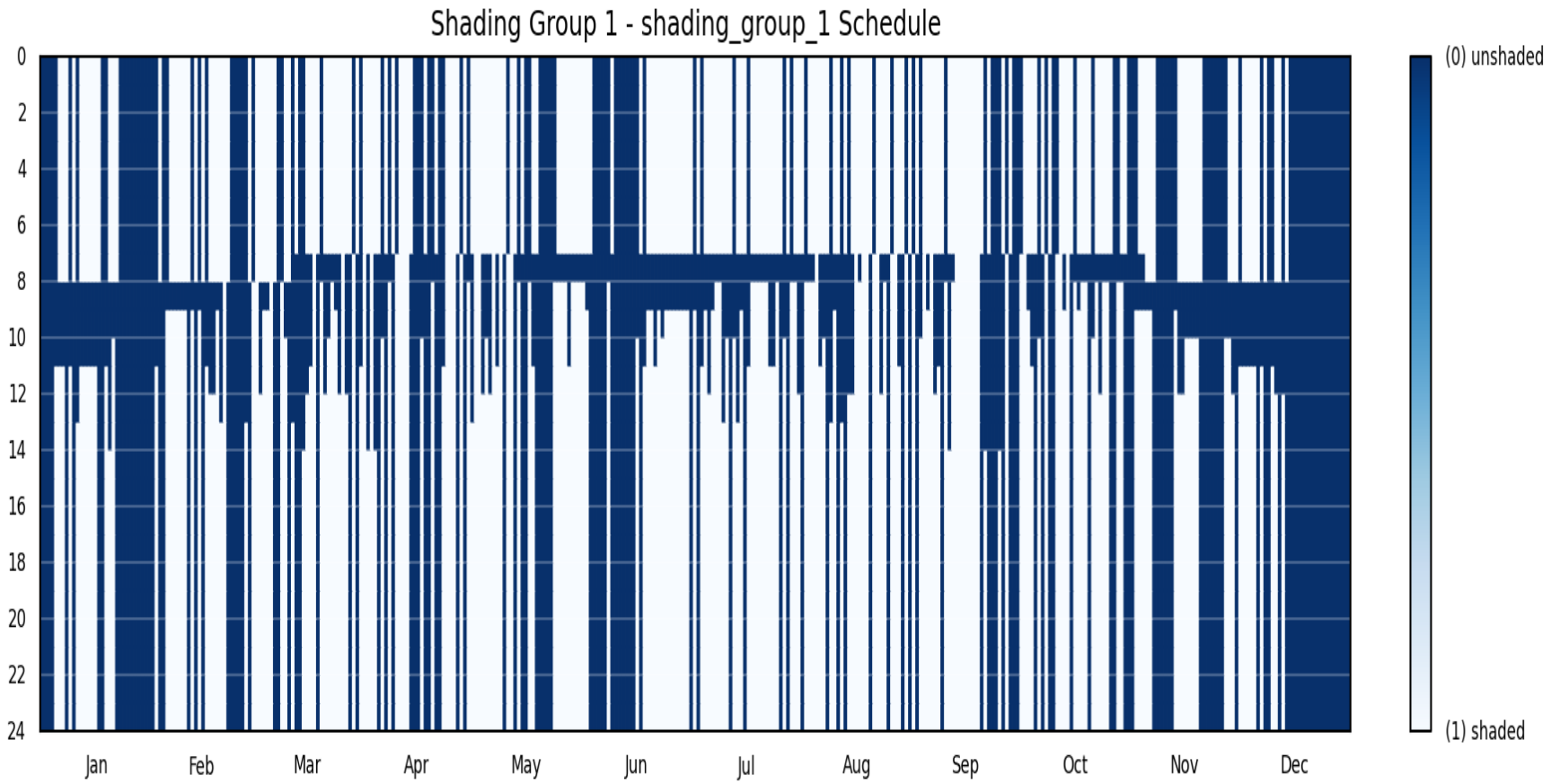


Blinds

Horizontal venetian blind modelled

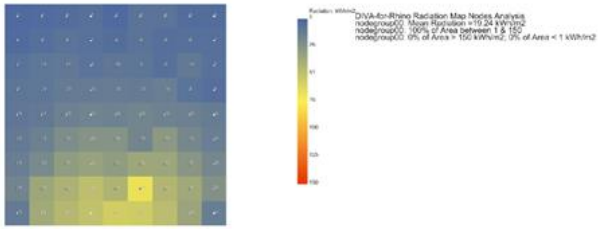


Blinds Operation

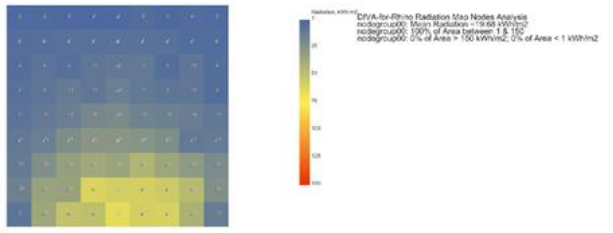


Redirection Film

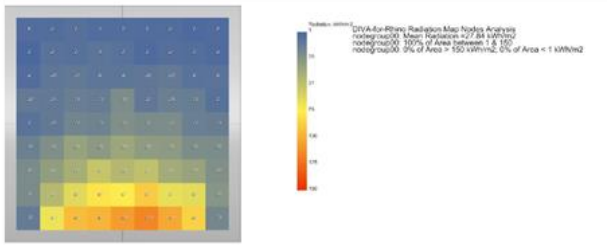
Light Redirection Film



Standard Diffusion Film



No Film



Conclusions

- High as possible to soffit
- 28-30% Glazing of one wall
- Blinds needed on south or 2 sources of light
- Appropriate reflectances & visible transmittance (VT)