

USING VIRTUAL REALITY TO VALIDATE NEW METRICS FOR PREDICTION OF DAYTIME VIEW-OUT QUALITY AND PRIVACY

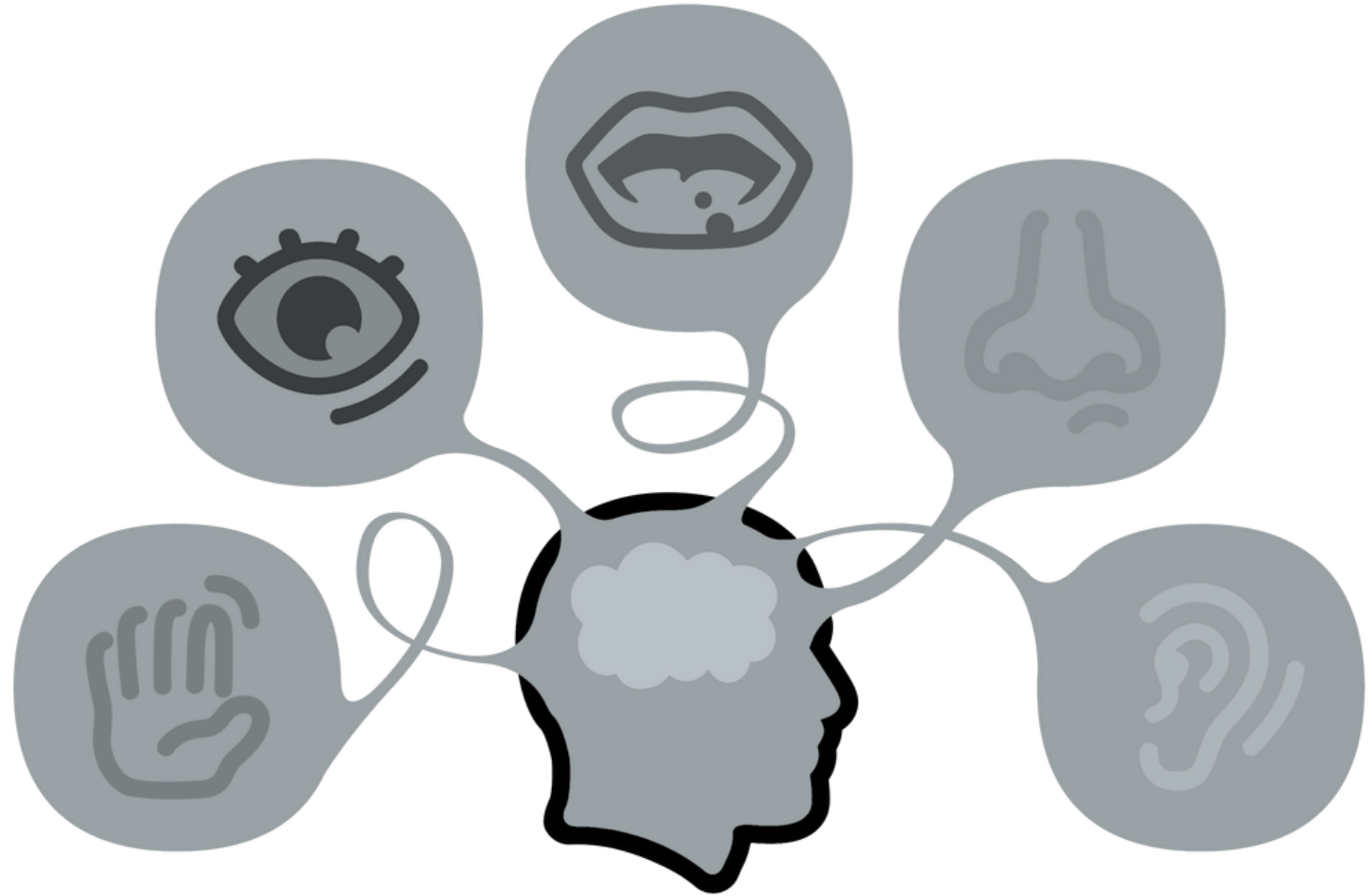
THE REVALUE PROJECT

Identify non-energy benefits in retrofits that can be the catalyst for investments in extensive energy conserving measures for existing multi-family housing.

SPATIAL QUALITY : DEFINITION

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The spatial quality of an **indoor environment** is a **subjective** human conviction based on a **multi-sensory experience** of the space.



SPATIAL QUALITY : PHENOMENA

Numerous phenomena affects the 'quality experience' of a space...

Articulation: **Qualitative**

Examples: 'Bodily identification'
'Spatial juxtaposition and interpenetration'
'Enclosure, demarcation, texture'
'Thermal comfort'
'Acoustics'
'Glare'

Evaluation: **Intuition // Descriptive Guidelines**

SPATIAL QUALITY : PHENOMENA

Numerous phenomena affects the 'quality experience' of a space...

Articulation: **Qualitative**  **Quantitative**

Examples: 'Bodily identification'
'Spatial juxtaposition and interpenetration'
'Enclosure, demarcation, texture'
'Thermal comfort'
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'Glare'

Evaluation: **Intuition // Descriptive Guidelines // Calculations**

WINDOWS GOVERNS MANY PHENOMENA THAT AFFECTS THE PERCEPTION OF SPATIAL QUALITY

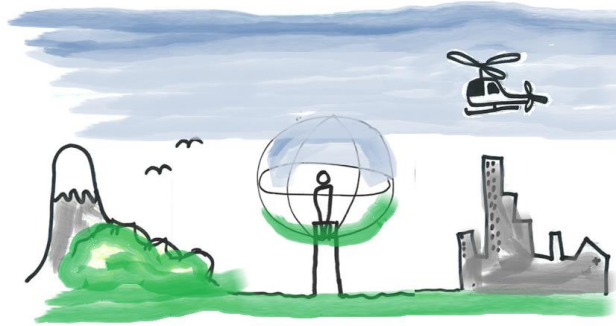
Window design variables such as number, size, placement, and transparency governs subjective perception of:

Lighting level, noise, thermal comfort, and air quality...

...but also such as **view-out** and **privacy**.

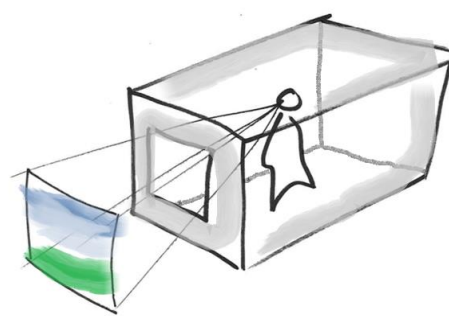


QUANTIFICATION OF VIEW-OUT AND PRIVACY



Reference view

- Sub-areas -
- Subjective factors (0-1) for view-out quality and privacy -

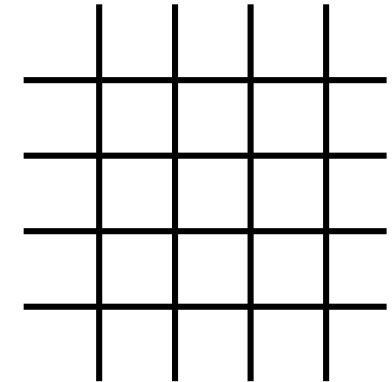


View-out

- Reduced area -



Area-weighted factors



Horizontal grid, point in eye position

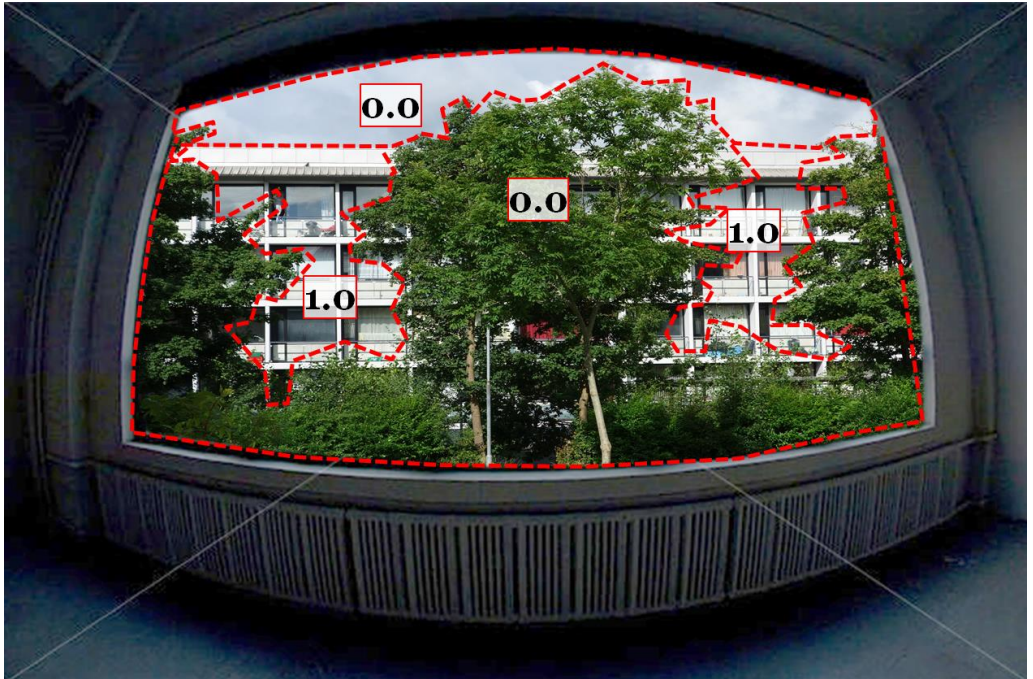
Hypothesis

The area-weighted view-out quality or privacy factor (0-1) corresponds to the subjective vote of the view-out quality or privacy (0-1) in any grid point.

CALCULATION EXAMPLE

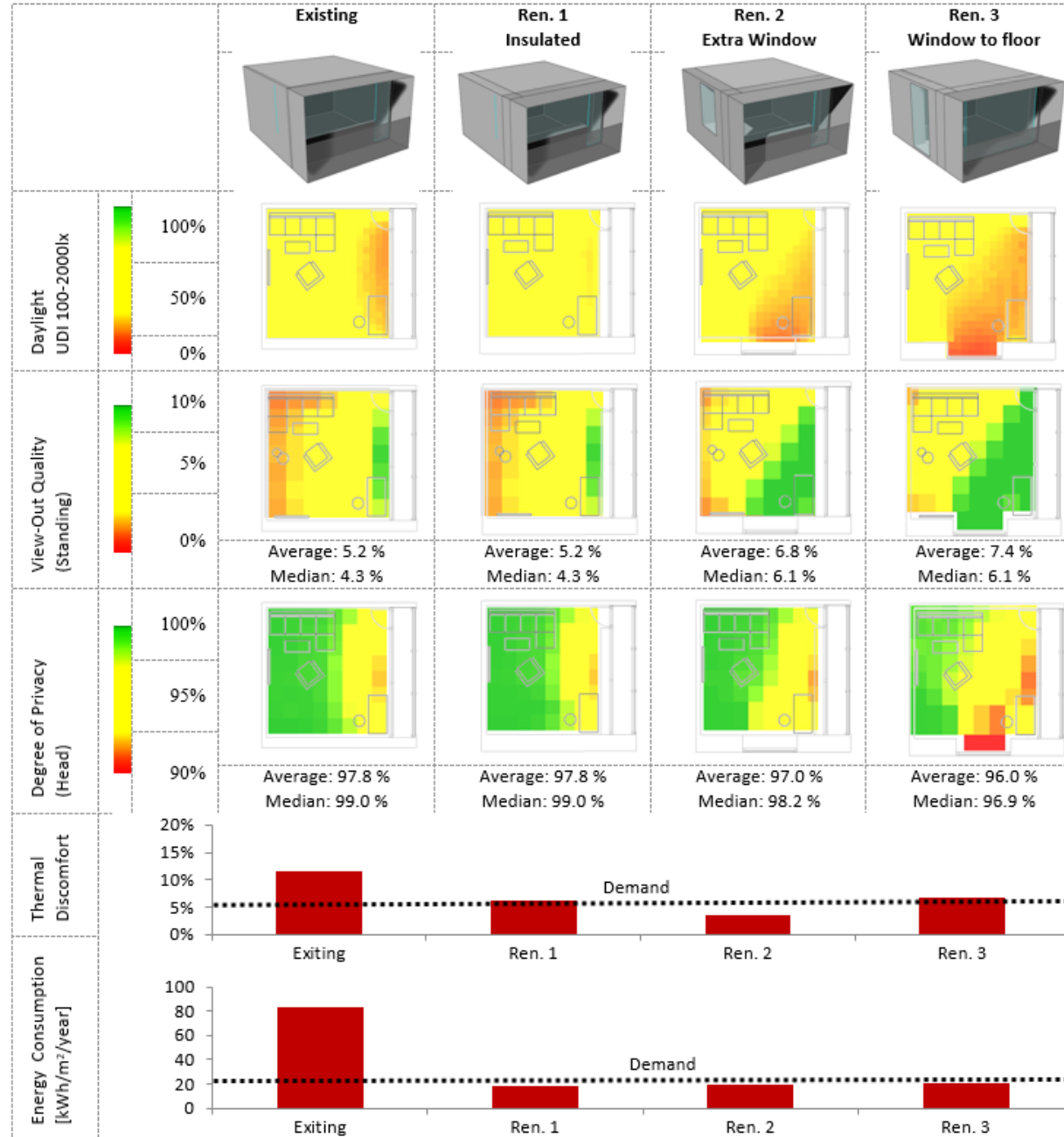


View-out quality factors

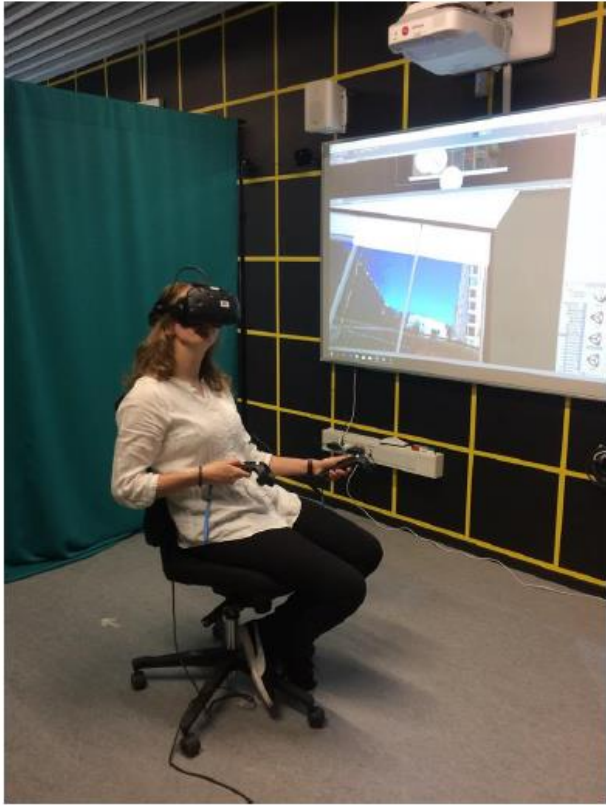


Privacy factors

RESULTS



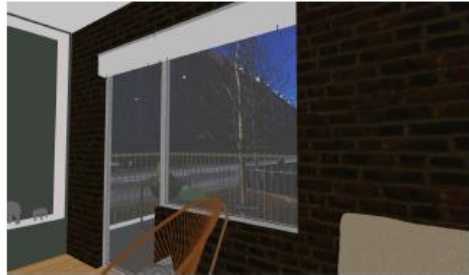
VALIDATION OF VIEW-OUT QUALITY AND PRIVACY FACTORS



90 participants



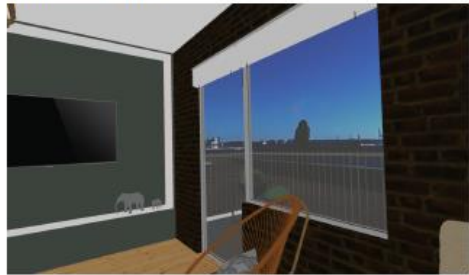
(a) Environment A: View from the sofa with the big glazing area



(b) Environment A: View from the sofa with the small glazing area



(c) Environment B: View from the sofa with the big glazing area



(d) Environment B: View from the sofa with the small glazing area



(e) Environment C: View from the sofa with the big glazing area



(f) Environment C: View from the sofa with the small glazing area

RESULTS



| Environment A | View-out quality | | | Privacy | | |
|-----------------------|------------------|------------|----------|---------|------------|----------|
| | Model | Experiment | Δ | Model | Experiment | Δ |
| Large glazing area | 0.50 | 0.57 | -0.07 | 0.36 | 0.45 | -0.09 |
| Moderate glazing area | 0.40 | 0.69 | -0.29 | 0.53 | 0.24 | -0.12 |

| Environment B | View-out quality | | | Privacy | | |
|-----------------------|------------------|------------|----------|---------|------------|----------|
| | Model | Experiment | Δ | Model | Experiment | Δ |
| Large glazing area | 0.89 | 0.84 | +0.05 | 0.38 | 0.50 | -0.12 |
| Moderate glazing area | 0.76 | 0.80 | -0.04 | 0.47 | 0.70 | -0.23 |

| Environment C | View-out quality | | | Privacy | | |
|-----------------------|------------------|------------|----------|---------|------------|----------|
| | Model | Experiment | Δ | Model | Experiment | Δ |
| Large glazing area | 0.58 | 0.74 | -0.16 | 0.78 | 0.97 | -0.09 |
| Moderate glazing area | 0.50 | 0.54 | -0.04 | 0.89 | 1.00 | -0.11 |

CONCLUDING REMARKS

- The ReValue project has identified a promising calculable metric for view-out quality and privacy.
- The metrics can be used to instigate a qualitative discussion with stakeholders that prefer comparing numbers as indicator of quality.
- Equating spatial quality phenomena in the decision process.
- We acknowledge that further research is needed.



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