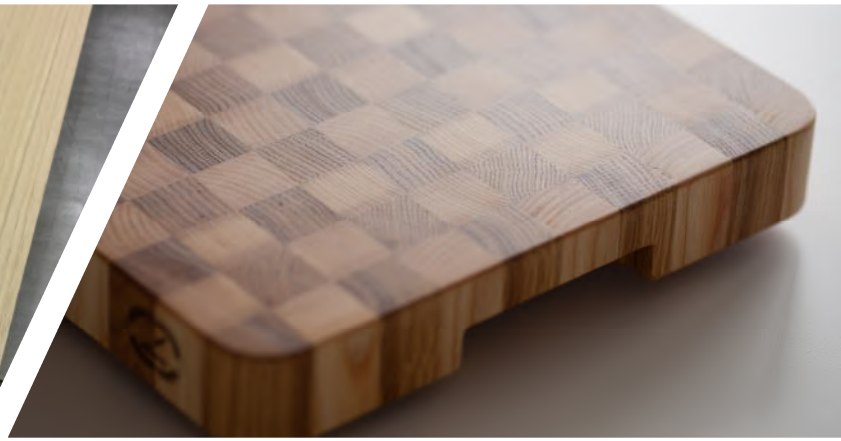
CET DESIGNER USER AND DEVELOPER CONFERENCE

Advanced Rendering

Andreas Ekbom
Marcos Arizpe
Configura/Steelcase

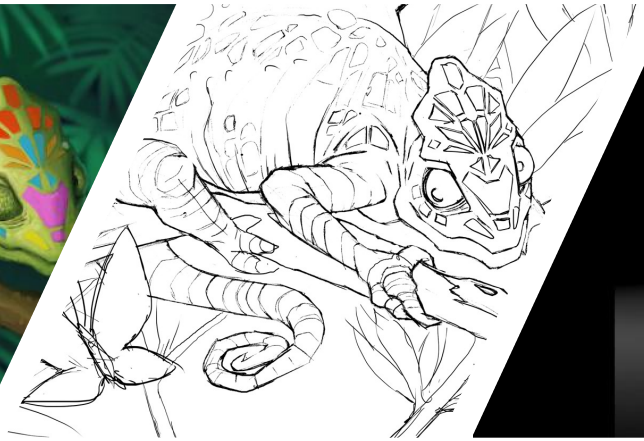
```
/**
 * Generate a Gauss table with 'radius' elements in the last (longest) row.
 * Standard  deviation is set to 'radius'/3.
 * The table is always 'maxGaussRadius' elements long but anything beyond radius is padded wit
 * Further details see: http://en.wikipedia.org/wiki/Gaussian_blur
 */
public REDImage2D generateGaussMatrix(float radius=36, REDImage2D gaussImg=null,
                                      str key="GaussImageTable") {
    float r = 0;
    fix float[] gaussTable(maxGaussRadius*maxGaussRadius);
    for (y in 0..(maxGaussRadius-1)) {
        float sd = r/3.0;
        for (x in 0..(maxGaussRadius-1)) {
            if (x < r) {
                gaussTable[maxGaussRadius*y + x] =
                    ((1.0/(sqrt(2.0*pi*(sd*sd))))*pow(exp(1.0), -((x*x)/(2.0*(sd*sd)'
            } else {
                if (x == 0) gaussTable[maxGaussRadius*y] = 1;
                else gaussTable[maxGaussRadius*y + x] = 0;
            }
        }
        r = min(r+1, radius);
    }
    dbg_verifyArray(gaussTable);
    if (gaussImg) {
        REDImage2D iGaussImg = gaussImg.IImage2D;
        iGaussImg.internalSetPixels(FMT_FLOAT, TGT_TEX_RECT, gaussTable,
                                    maxGaussRadius, maxGaussRadius, str
    } else {
        gaussImg = redImageCache.floatImage(gaussTable, sizeI(maxGaus
                                            TGT_TEX_RECT, FMT_FLOAT,
                                            key, WM_CLAMP_TO_EDGE);
    }
    return gaussImg;
}
```



- Master in Computer Science
- R&D Developer @ Configura since 2005
- Works at Configura Gothenburg office

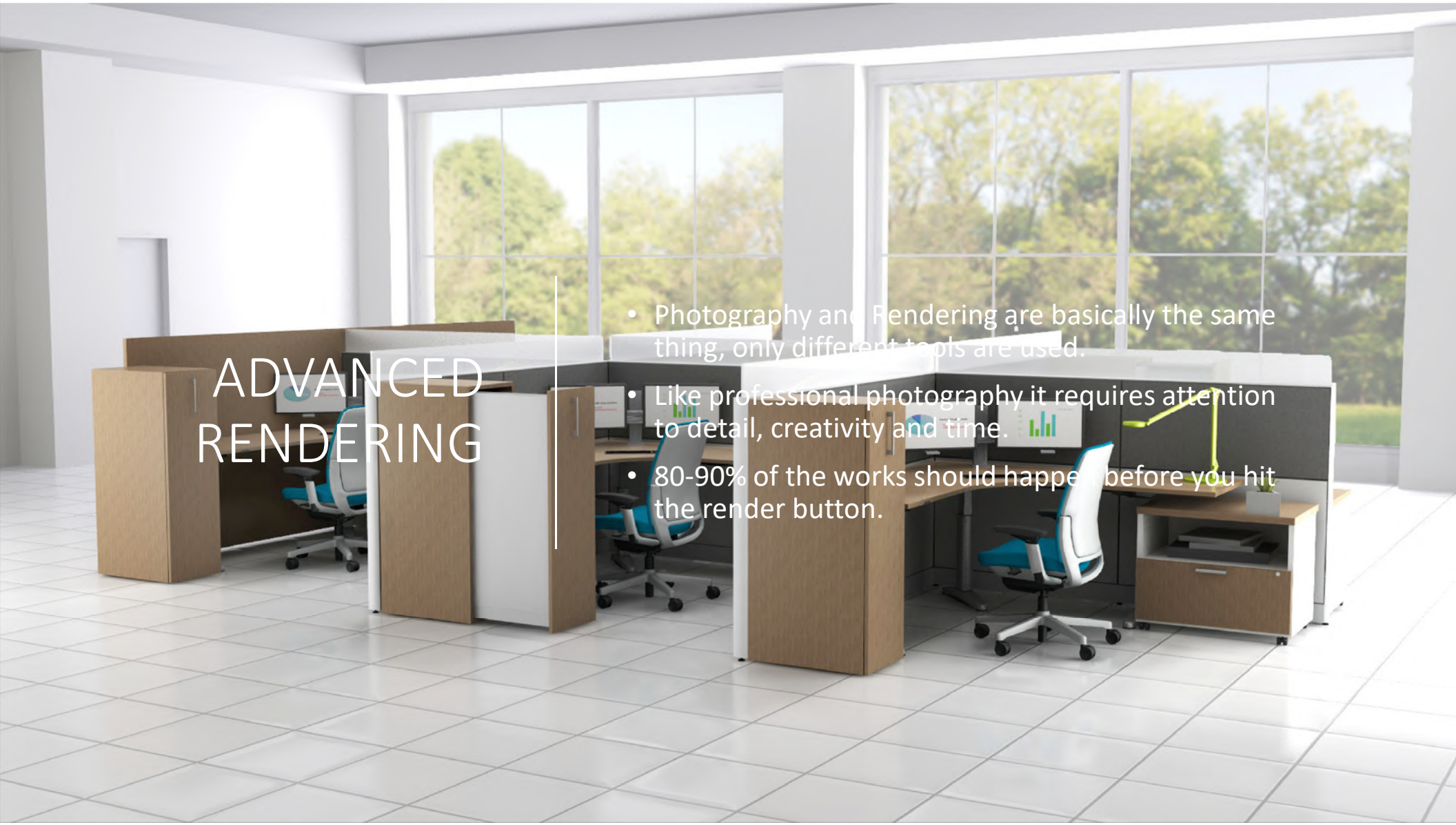
- Loves woodworking, photography and general geeky stuff.






- Industrial Designer
- Visualizer for 3 years at Steelcase
- Currently a designer specialized in visualization

- Loves art, philosophy and hiking.



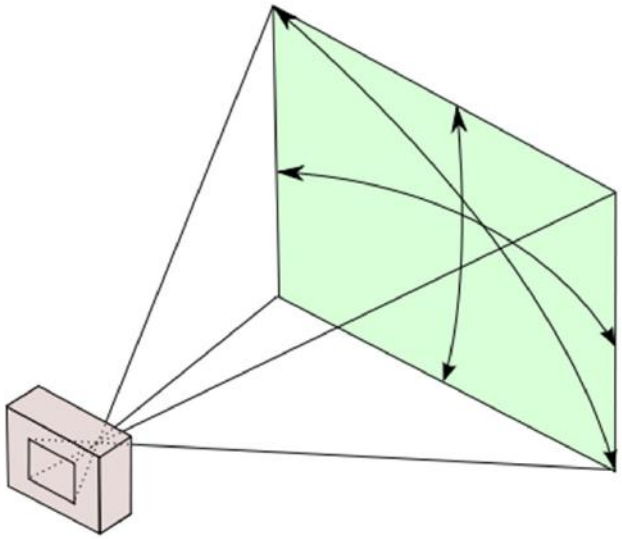
ADVANCED RENDERING

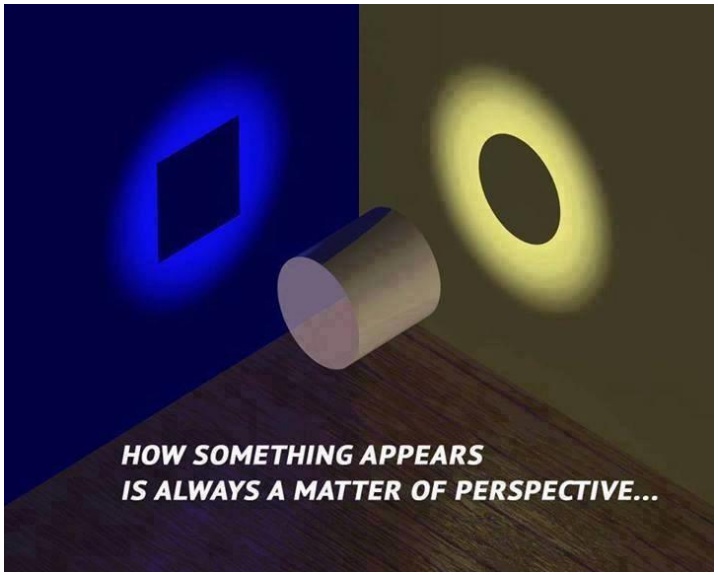
- Photography and Rendering are basically the same thing, only different tools are used.
- Like professional photography it requires attention to detail, creativity and time.
- 80-90% of the works should happen before you hit the render button.

ELEMENTS OF A GOOD IMAGE

IMAGE COMPOSITION

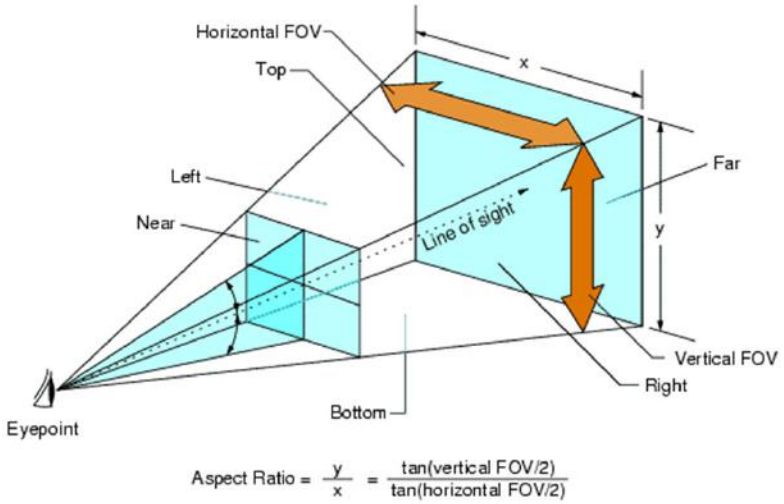
- Field of view (FOV) / Perspective
- Camera placement & direction
- Image aspect
- Framing





FIELD OF VIEW

- Wide FOV tends to look distorted
- Changing FOV can change the size of the background relative to the subject
- Aim for “human” FOV (40-60 deg)
- Wide for tight spaces



CAMERA PLACEMENT

- Try keeping pitch angle close to 0.
- Will keep vertical lines, vertical.
- Human perspective instead of birds-eye

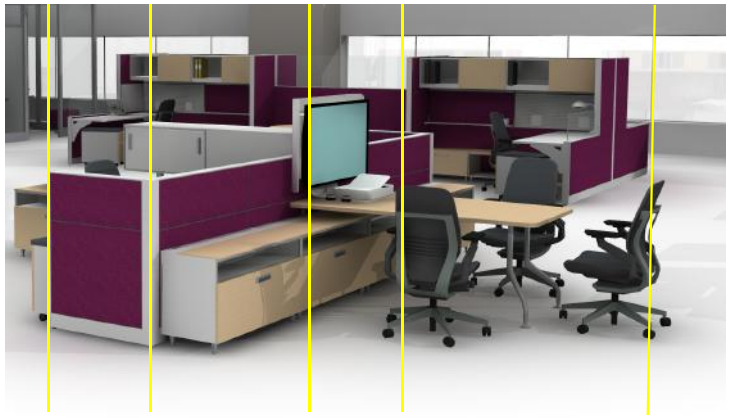


IMAGE ASPECT & RESOLUTION

- Target aspect
- Cropping
- Portrait/Landscape
- Enough resolution for target
- Viewing size vs. physical size
- Scale down/up
- Render time proportional to pixel count

COMPOSITION TIPS

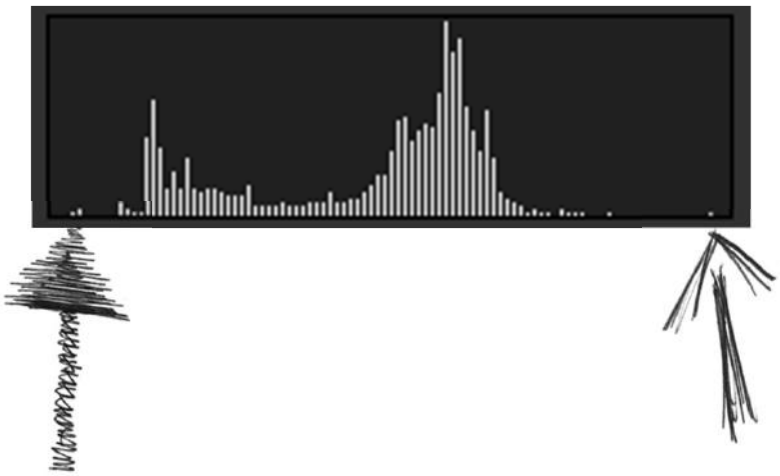
- Break synthetic alignment & symmetries
- Add imperfections
- Dirt, dust, scrap and clutter!

Break alignment of geometries as it would be in real life

Dynamic range

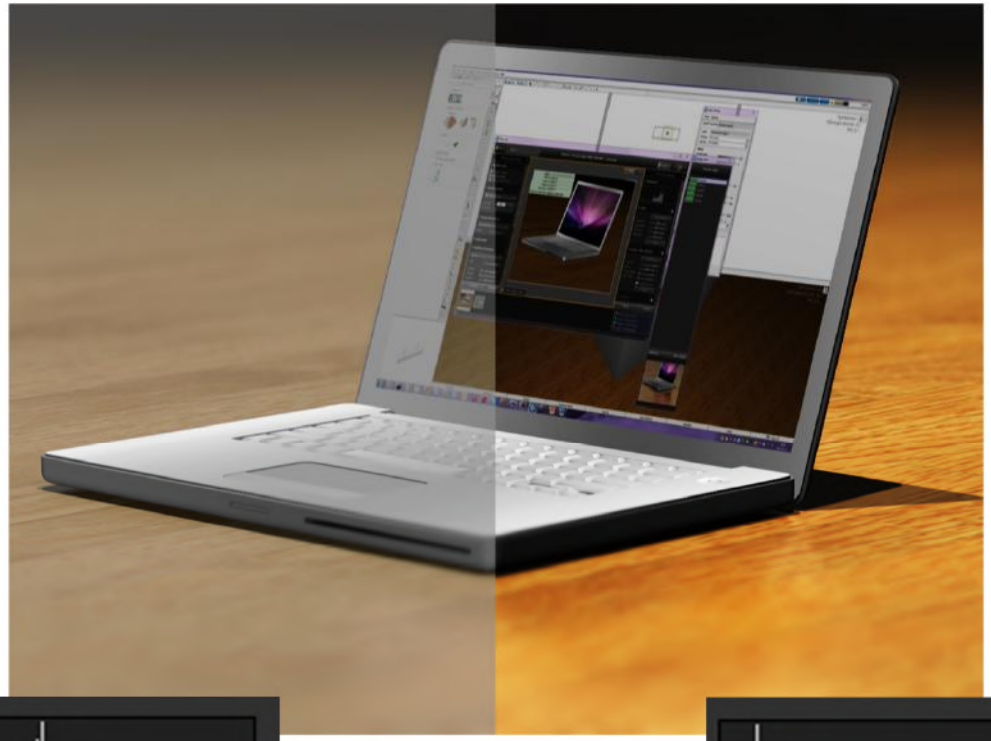
- The range of colors from darkest black to purest white that can be recorded and stored.

Histogram

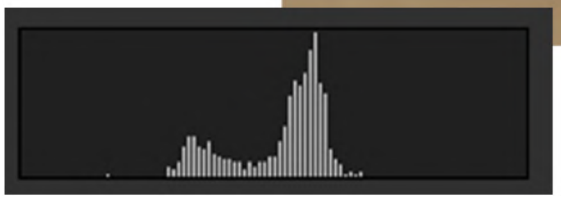


Dynamic range - contrast

Low Contrast
Narrow use of the availible dynamic range

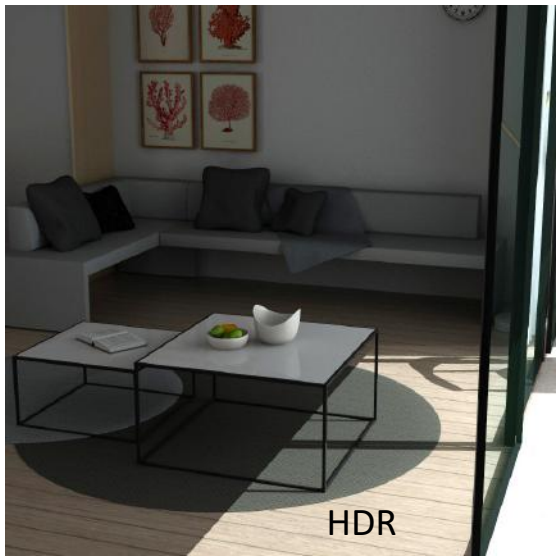


High Contrast
Use all of the availible dynamic range



HDR

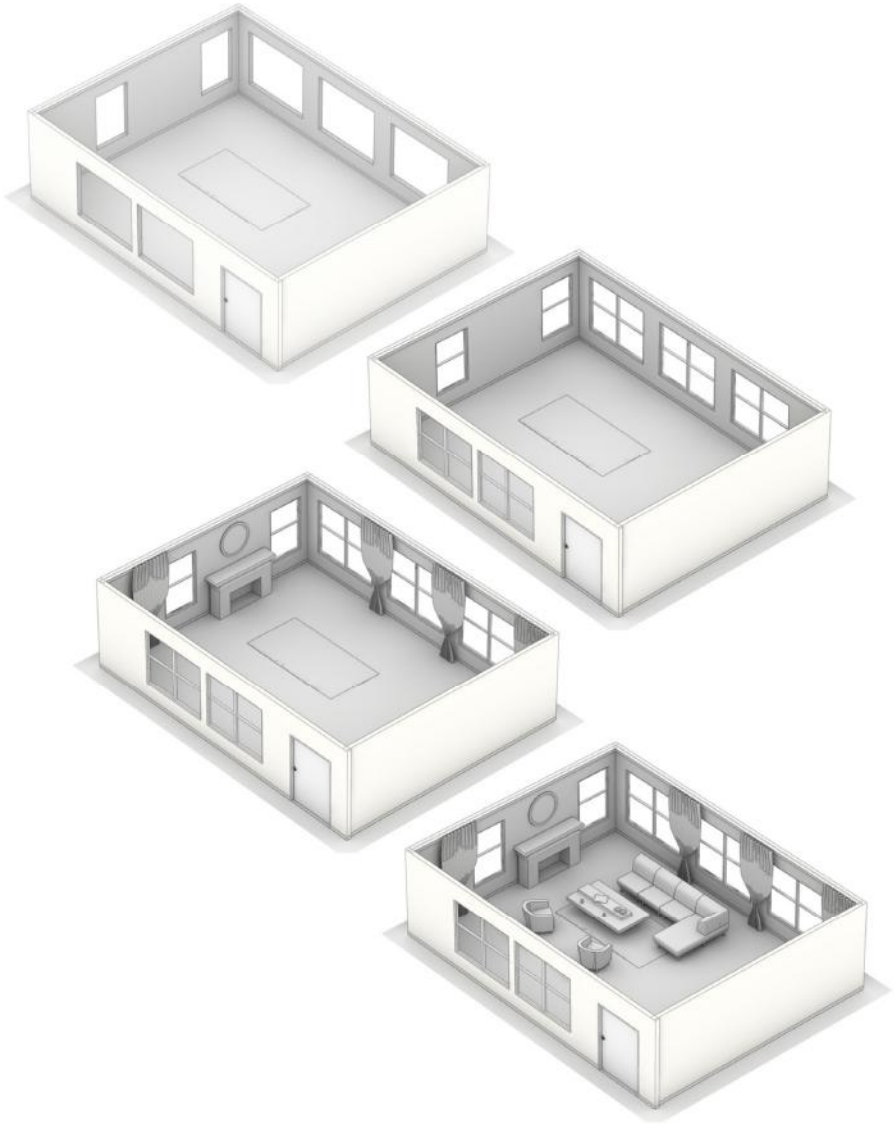
- High Dynamic Range
- Increases dynamic range
- $HDR = 2^{96} \sim 80\ 000\ trillion\ trillion\ color\ tones$
- $LDR = 2^{24} \sim 17\ million\ color\ tones$
- Overexposed details can be recovered

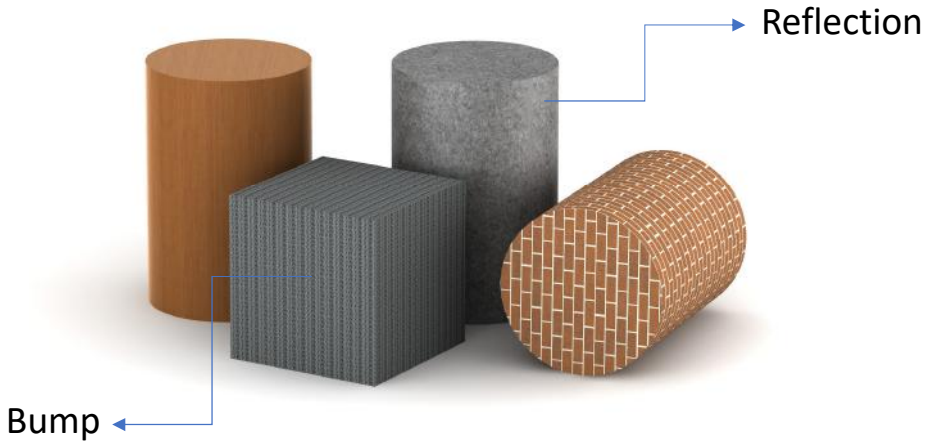


VISUALIZATION WORKFLOW

BUILDING UP THE SHELL

- Better to start with a closed space.
- Add as much detail as possible.
- Don’t forget about the ceiling!

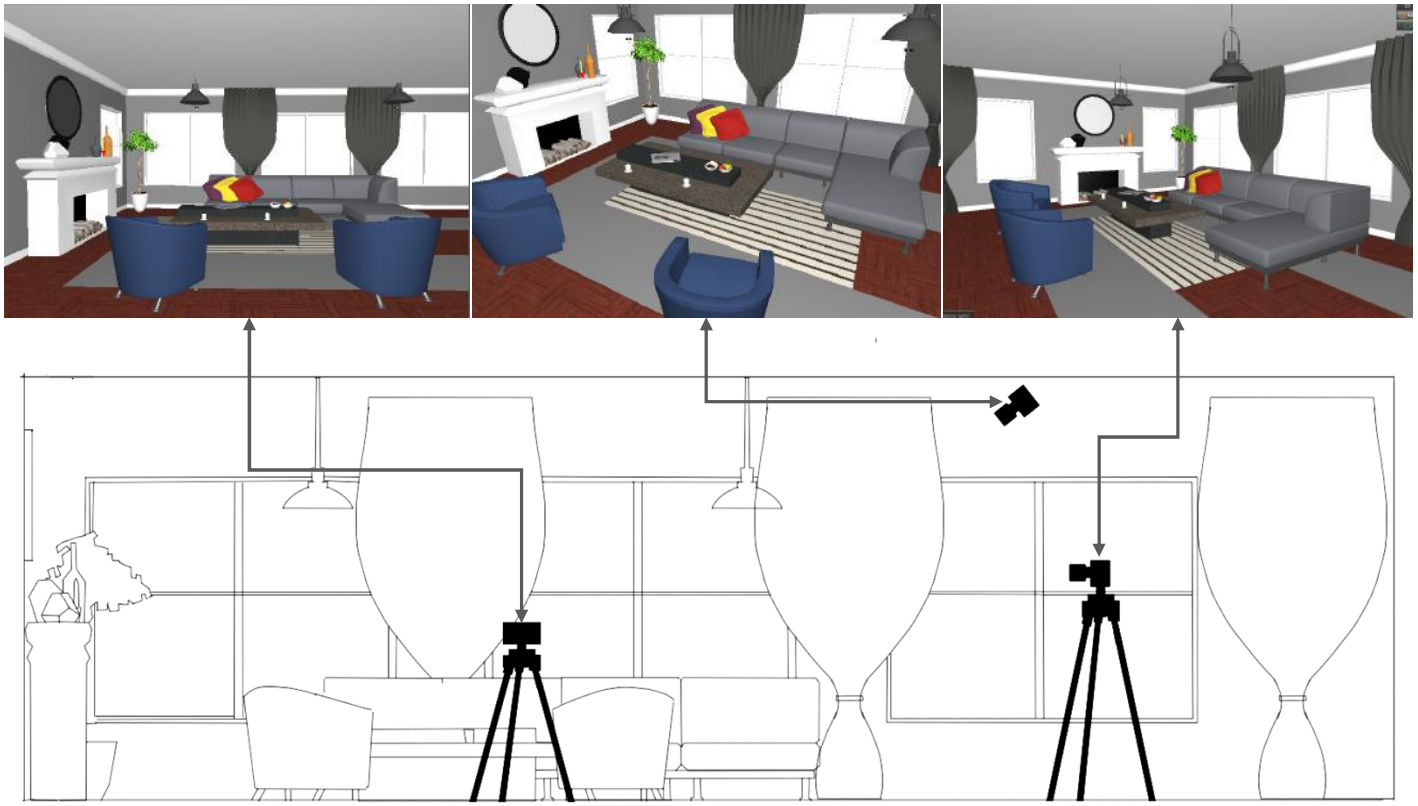




APPLYING MATERIALS

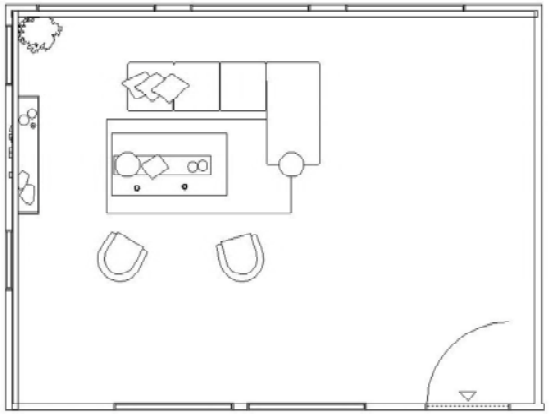
- Replace standard materials with materials from Material Library
- Tweak material as necessary
- Experiment!

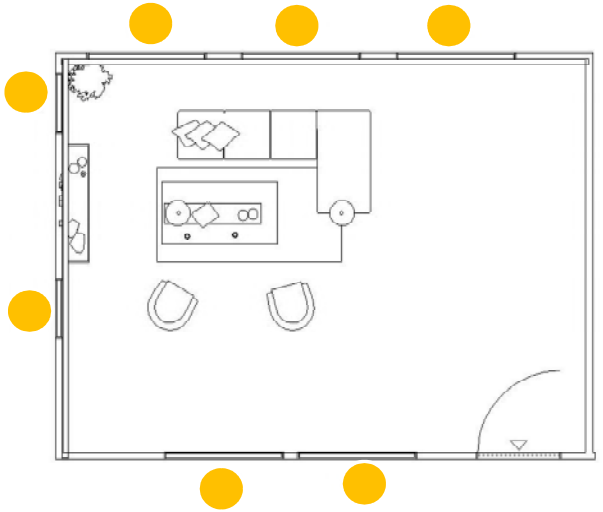
PERSPECTIVE AND CAMERA ANGLE



LIGHTING

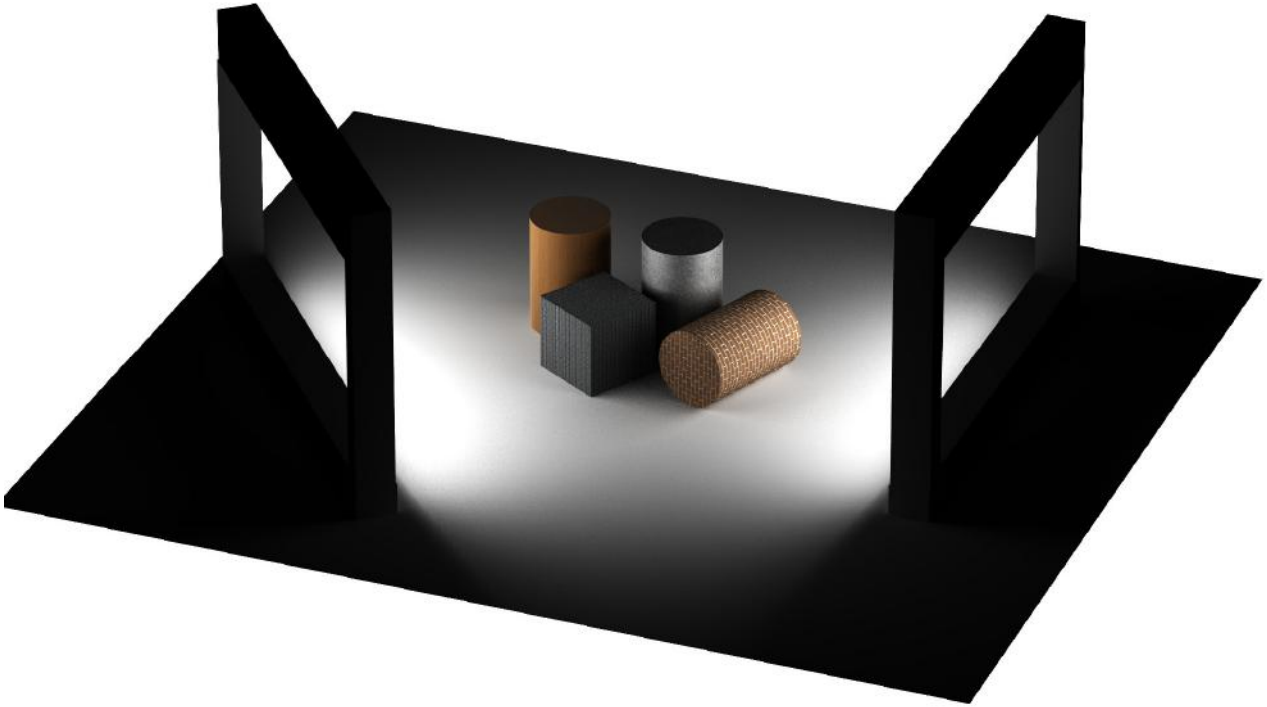
- In closed spaces emissive light is not enough.
- Natural light (window light) works best.
- Add light sources where needed.





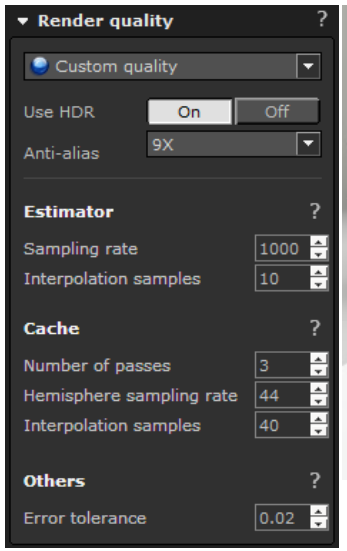
TIP!

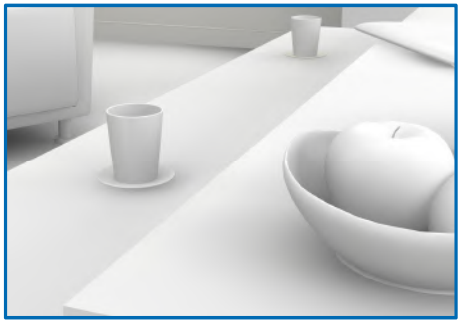
- Even if you don’t have windows in your building you can put freestanding walls with windows lights.



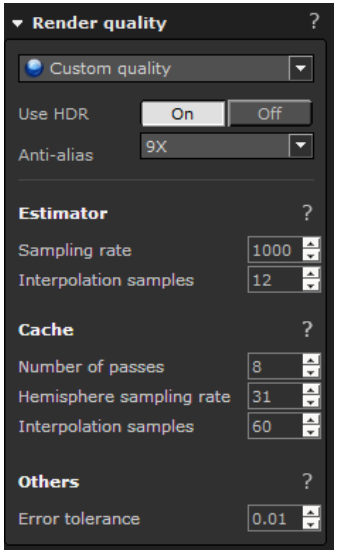
INCREASING THE QUALITY OF THE RENDERING

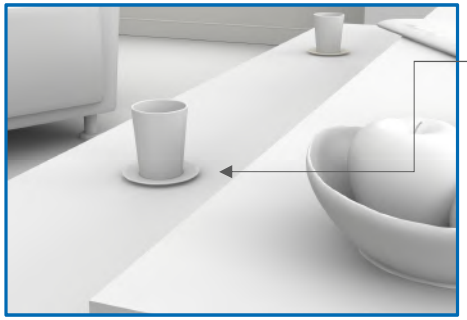
HIGH QUALITY.





CUSTOM, VERY HIGH, QUALITY.





More shadow detail

POST PROCESSING

- Keep it minimal.
- Rendering must look “good” without post processing. Use it to enhance colors/contrast.
- Some tools:
- Focus
- Vignette




BEFORE

AFTER

Not realistic angle

Lack of realistic materials

Ceiling and other walls are missing

Boring lightning

Realistic materials (reflections, bump)

Human perspective

More, better props

Overall better composition

Details like writing on whiteboard added in Post-production.

Symmetry can add balance to the image

Reflective materials

2 light sources


ADVANCED RENDERING
VISUALIZATION GIVES YOU THE OPPORTUNITY OF SEEING YOURSELF IN THE PRODUCT YOU ARE CREATING