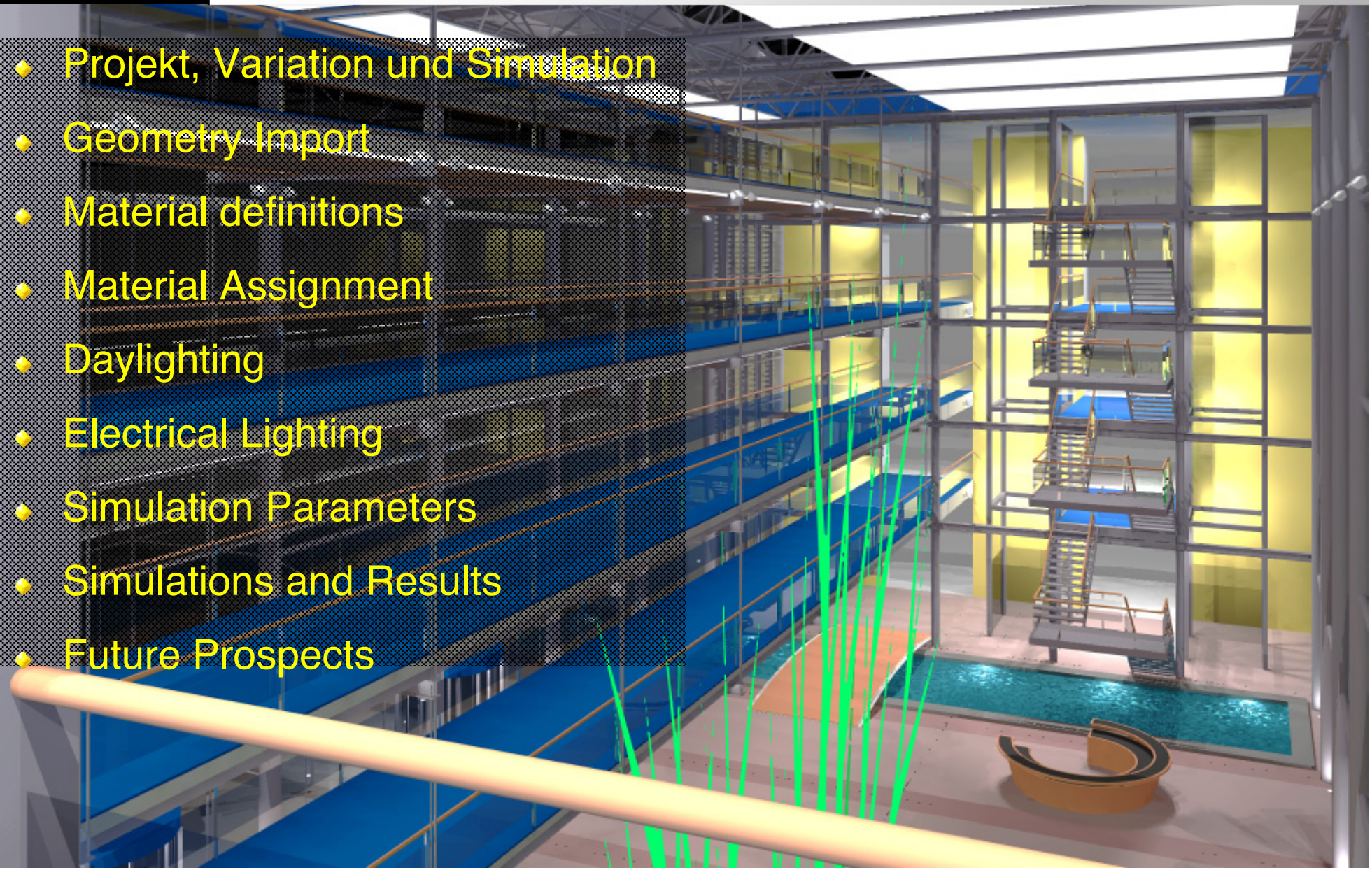
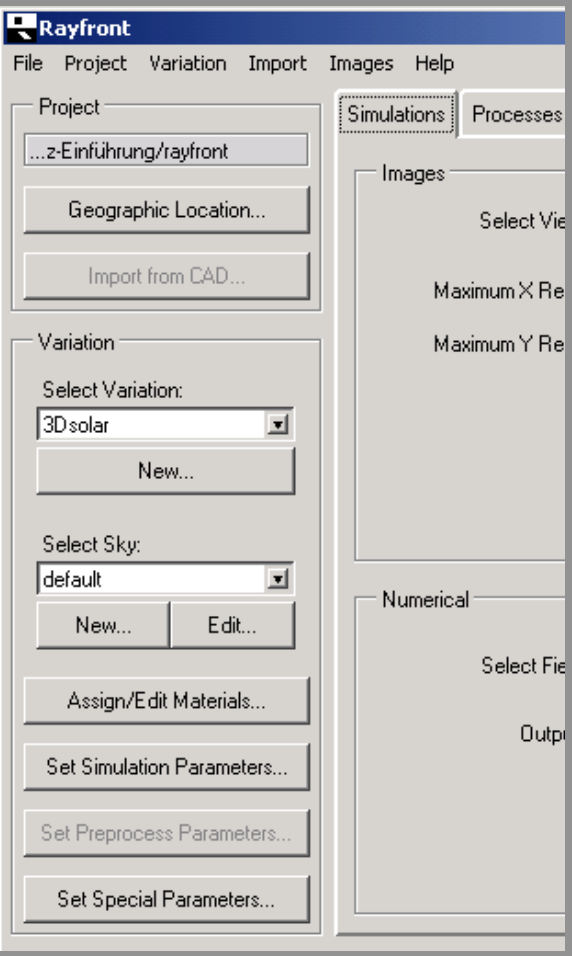
Georg Mischler

Lighting Simulation with Rayfront



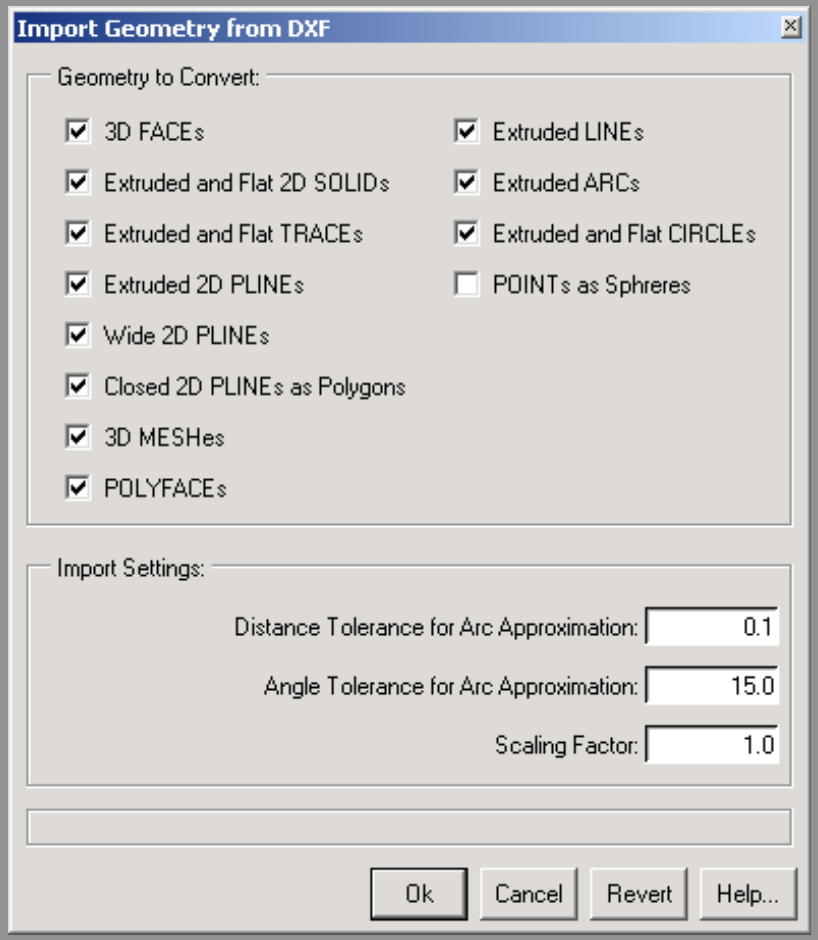
- Projekt, Variation und Simulation
- Geometry Import
- Material definitions
- Material Assignment
- Daylighting
- Electrical Lighting
- Simulation Parameters
- Simulations and Results
- Future Prospects

Projekt, Variation and Simulation



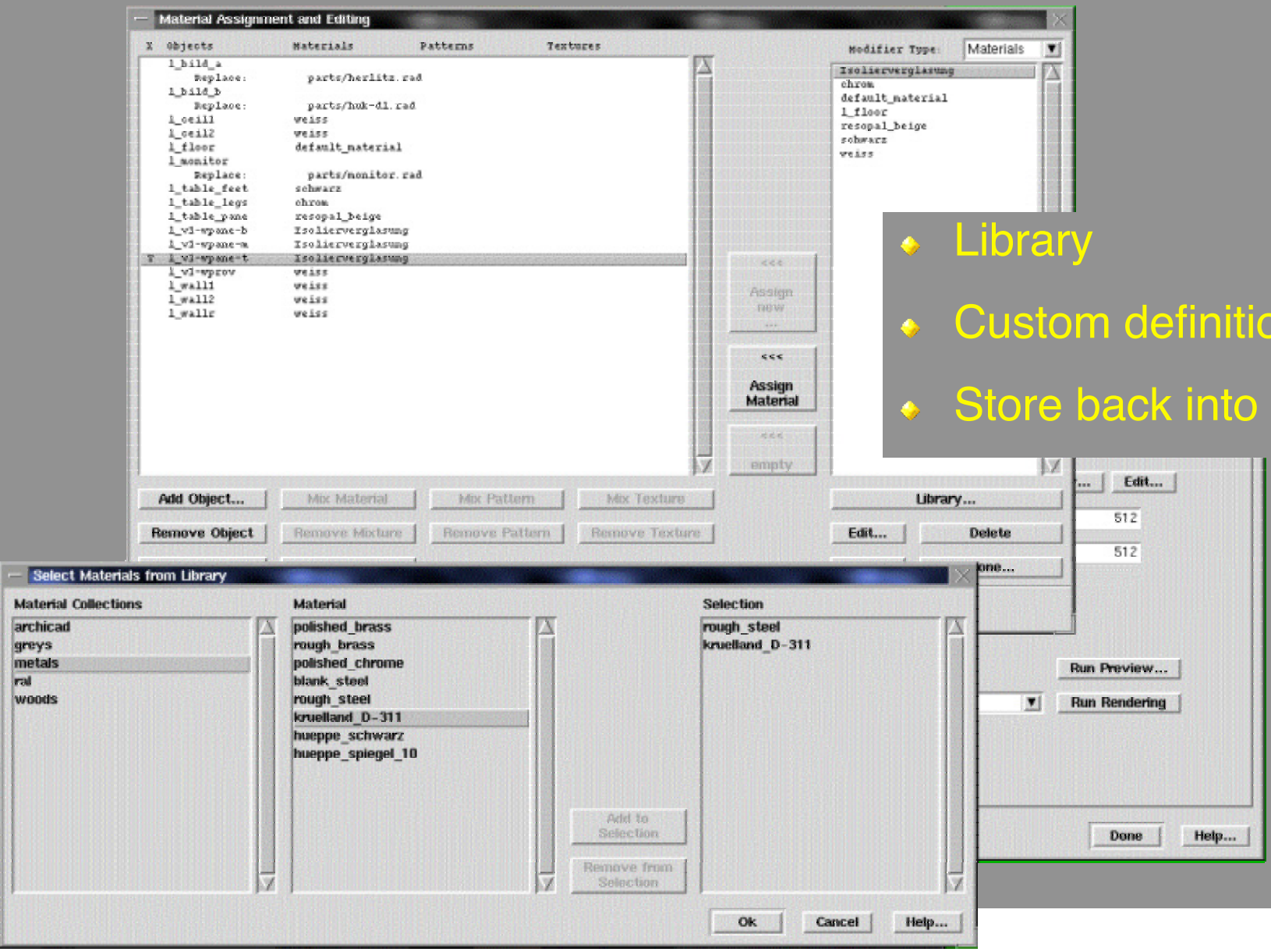
- Projekt
  - Geometrie-Objects
  - Material Definitions
  - Skies
  - Electrical Lighting
- Variation
  - Specific Combination of above Elements
- Simulation
  - Individual Computation for a View or Measuring Grid

Geometry-Import



- 3Dsolar/3Dlighting
- Autocad
- DXF

Material definitions

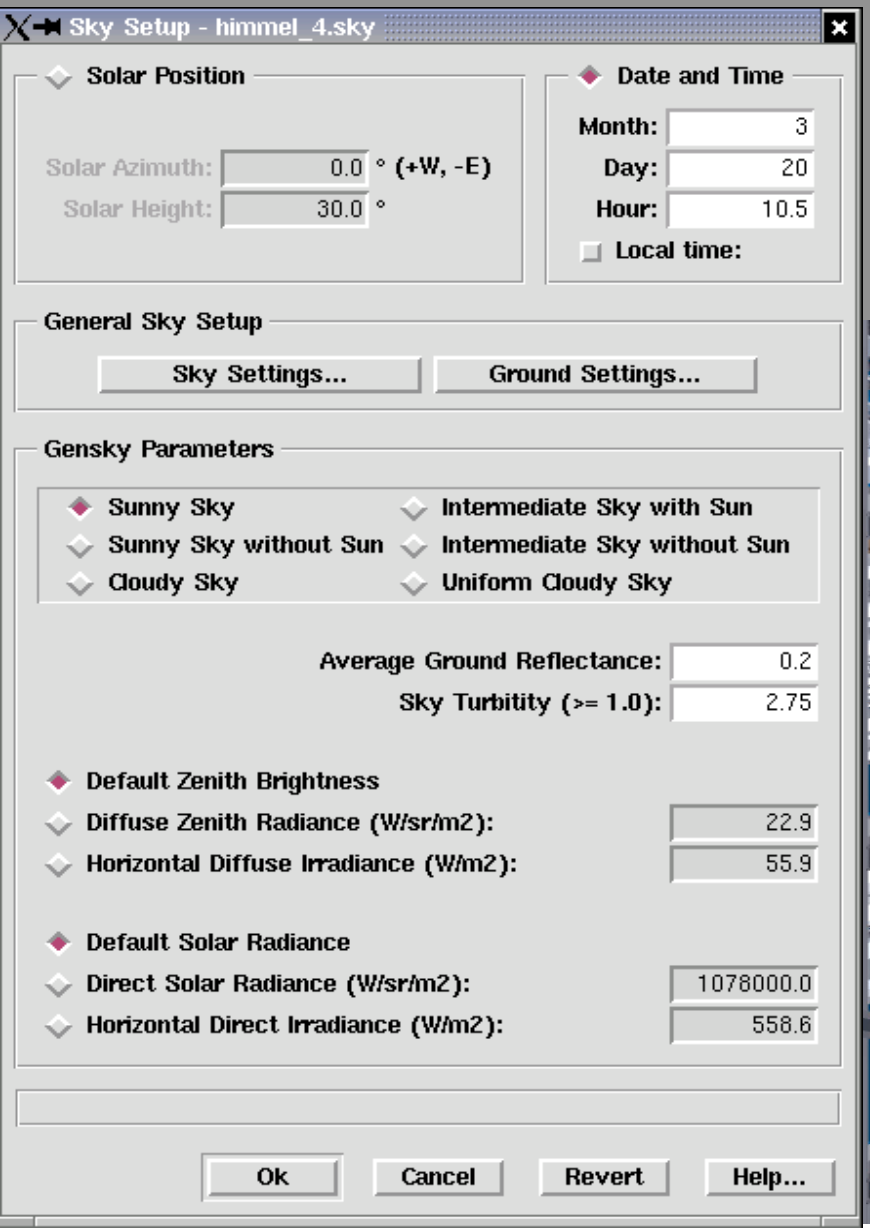


- Library
- Custom definitions
- Store back into library

Material Assignment

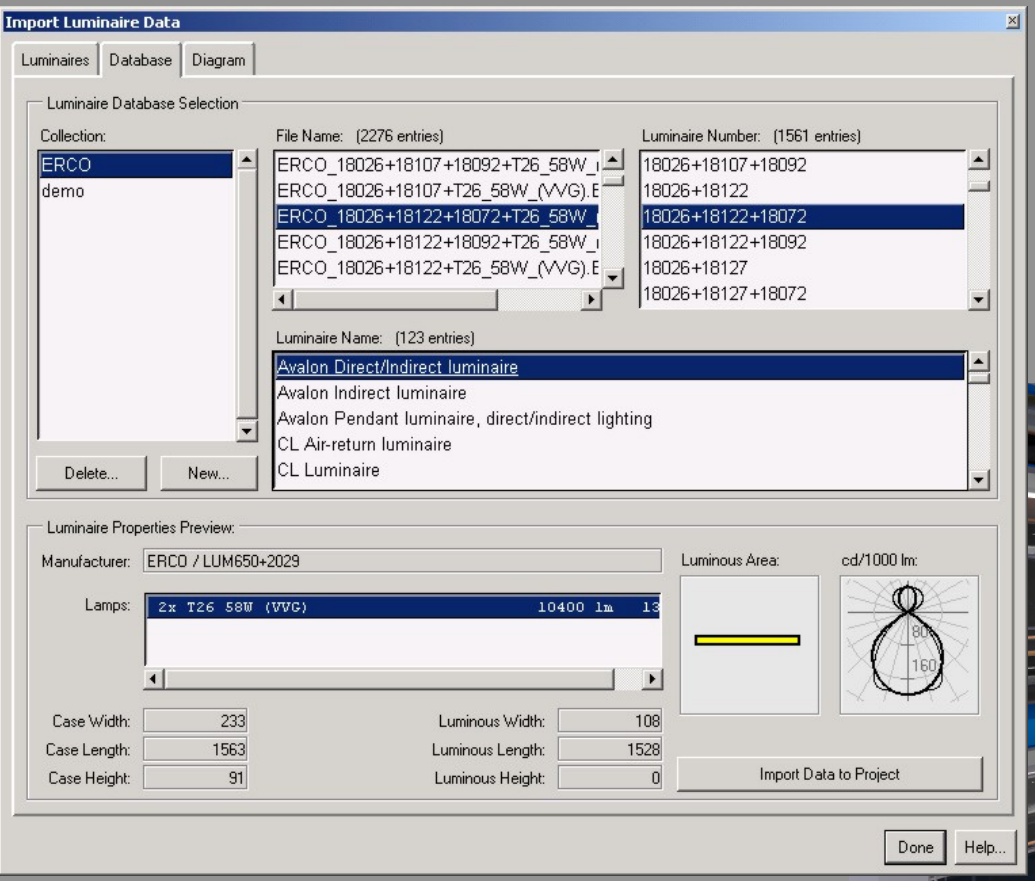
- “Normal” Materials
- Precalculation
- Daylight Redirection
- Objekt-Substitution
- Luminaires

Daylighting

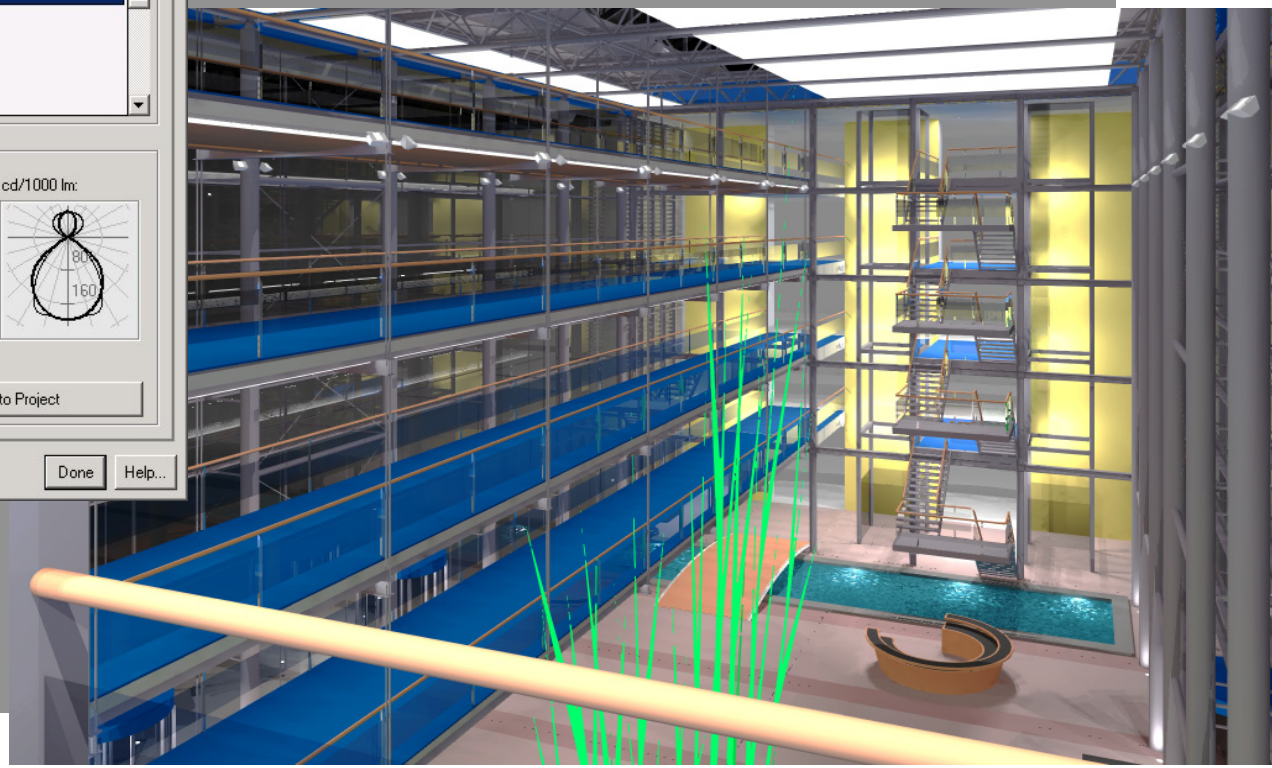


- Sky definitions (CIE)

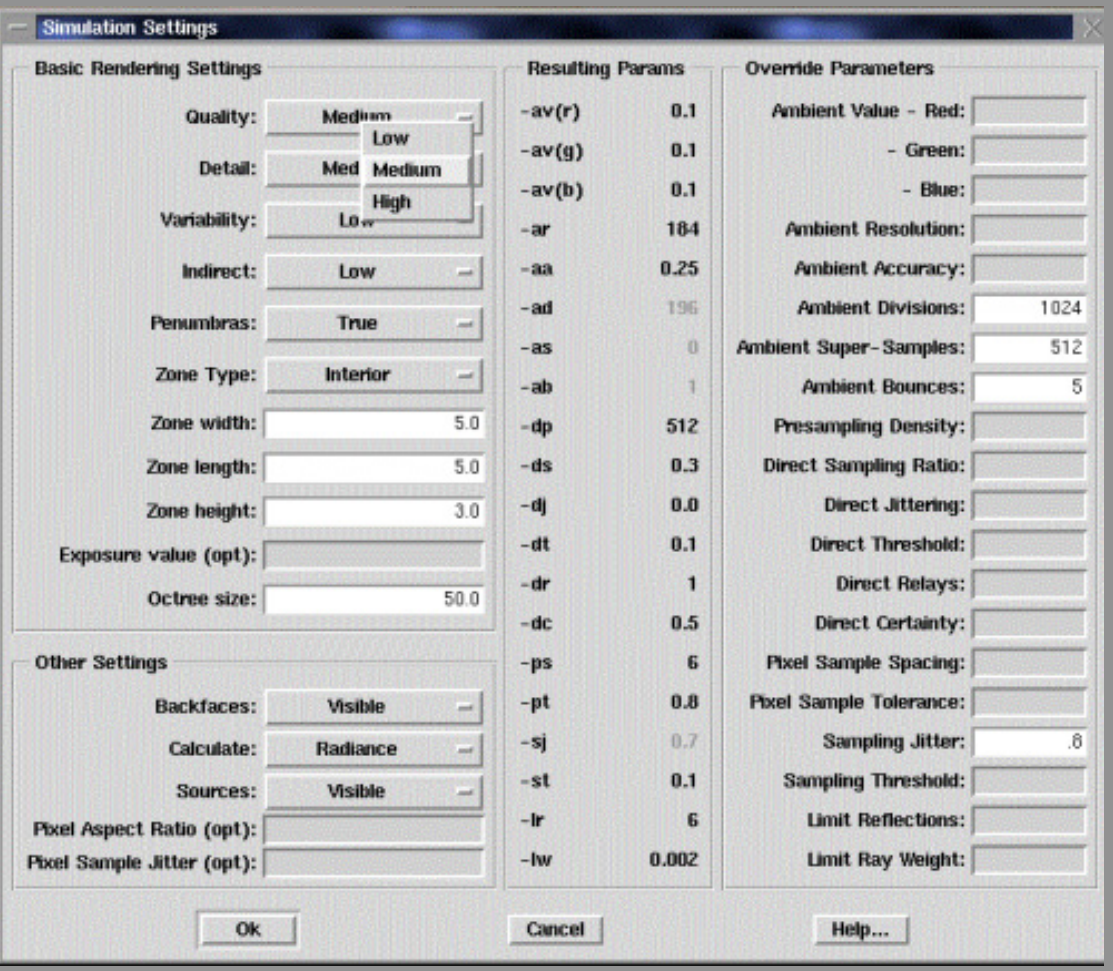
Kunstlicht



- Import of Luminaire Data
  - Eulumdat
  - IESNA
  - CIBSE TM-14

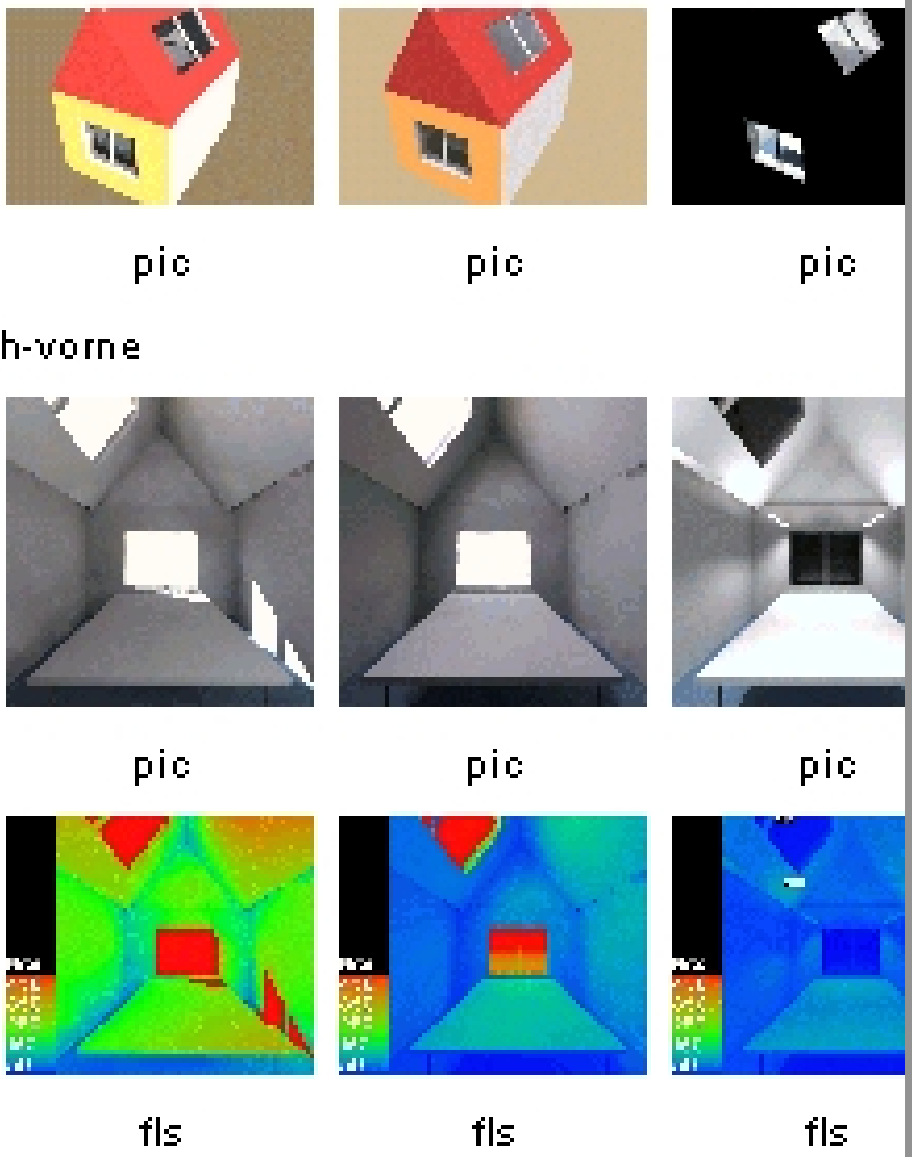


Simulation Parameters



- Simple
  - Qualitative
  - Automatic Details
- Expert Mode
  - Display of Parameters
  - Manual Correction

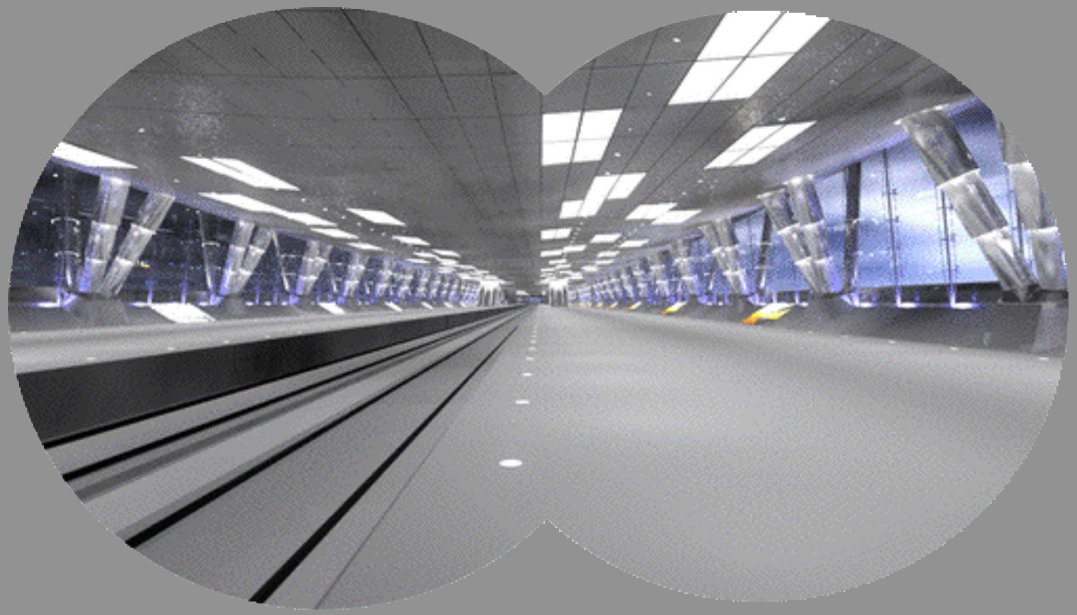
Simulations and Results



- “Click”
- Results
  - Illuminance
  - Luminance
  - Daylight Factor
  - Images
  - Numerical Data
- Networking
- 3DLighting-Batch
- Process Management

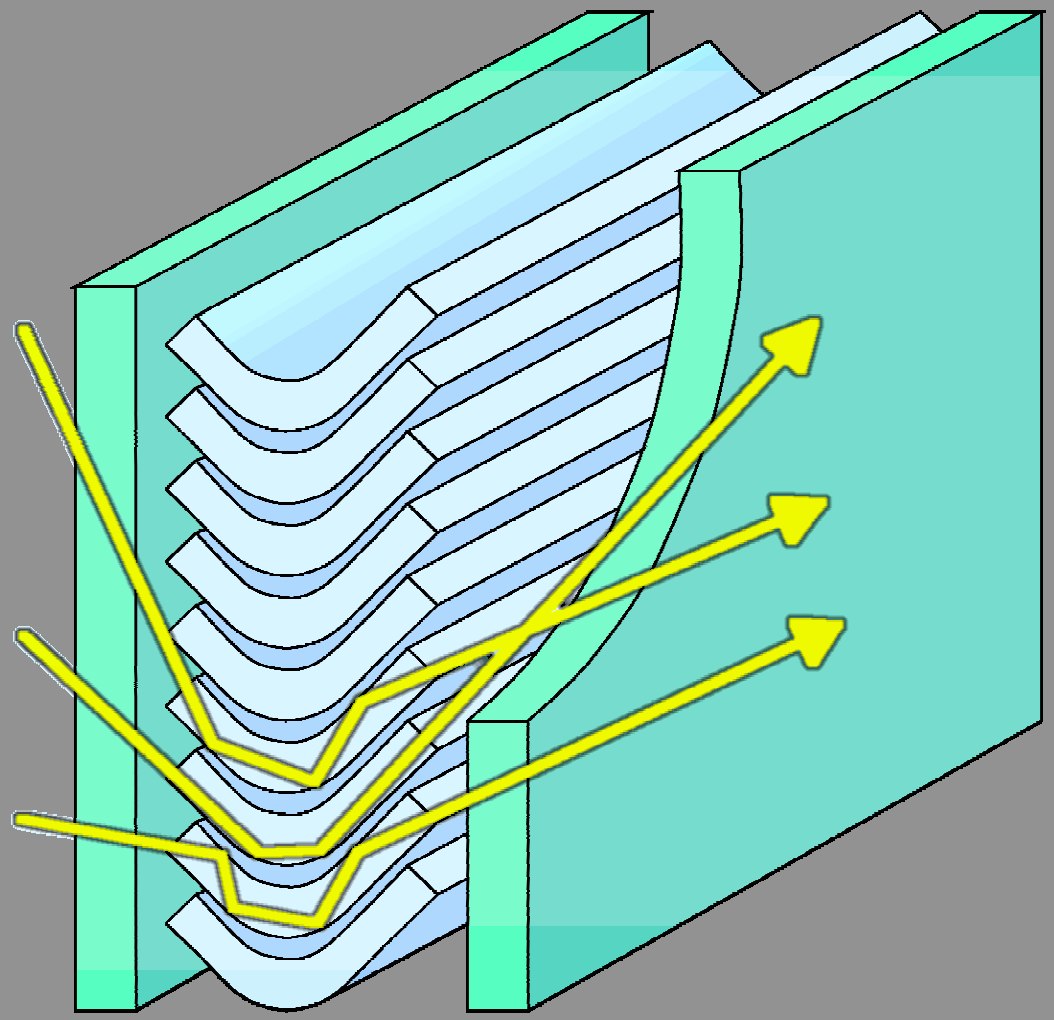
Future Prospects

- Current Radiance Version
- Improved Integration
- Graphical Material Assignment
- Suggestions?



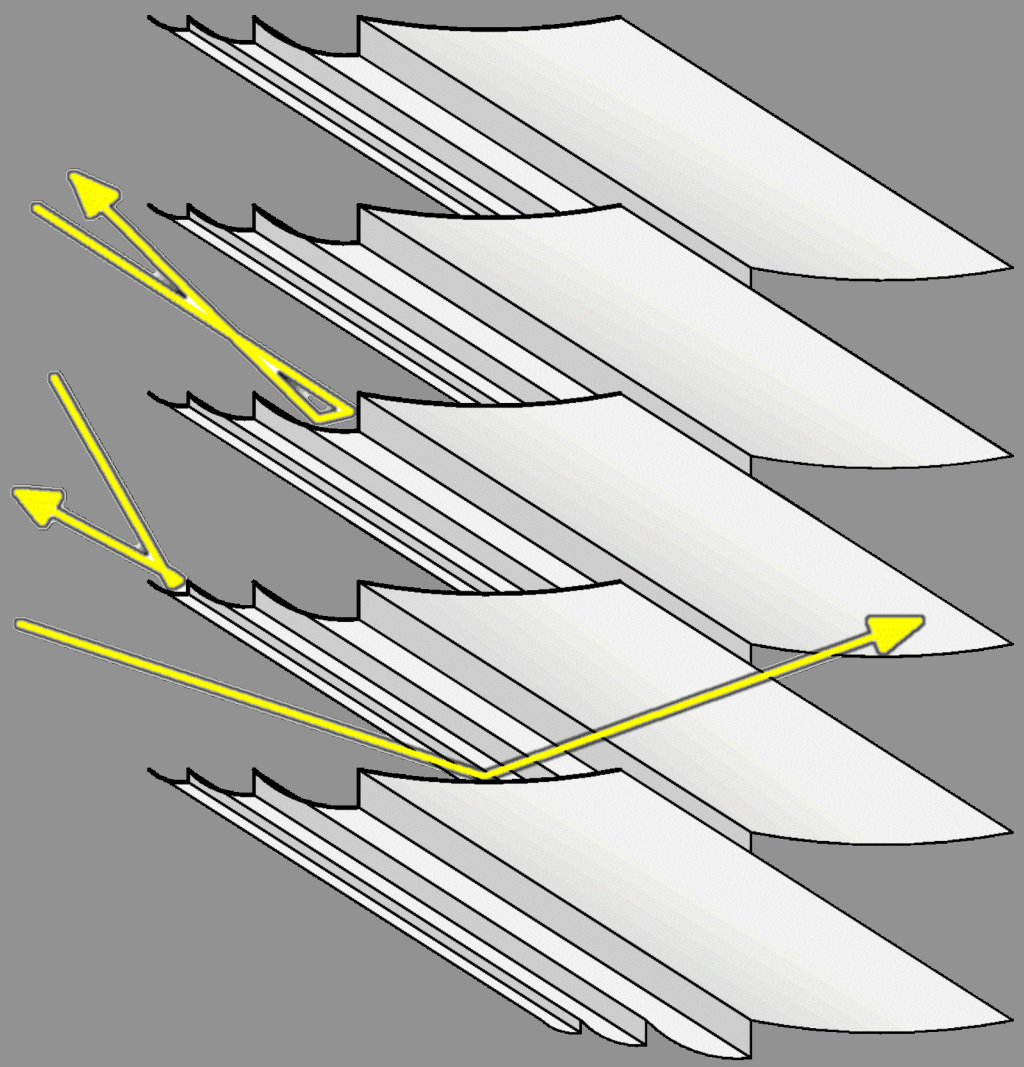
Simulating Daylight Redirection Systems

Daylight Redirection Systems



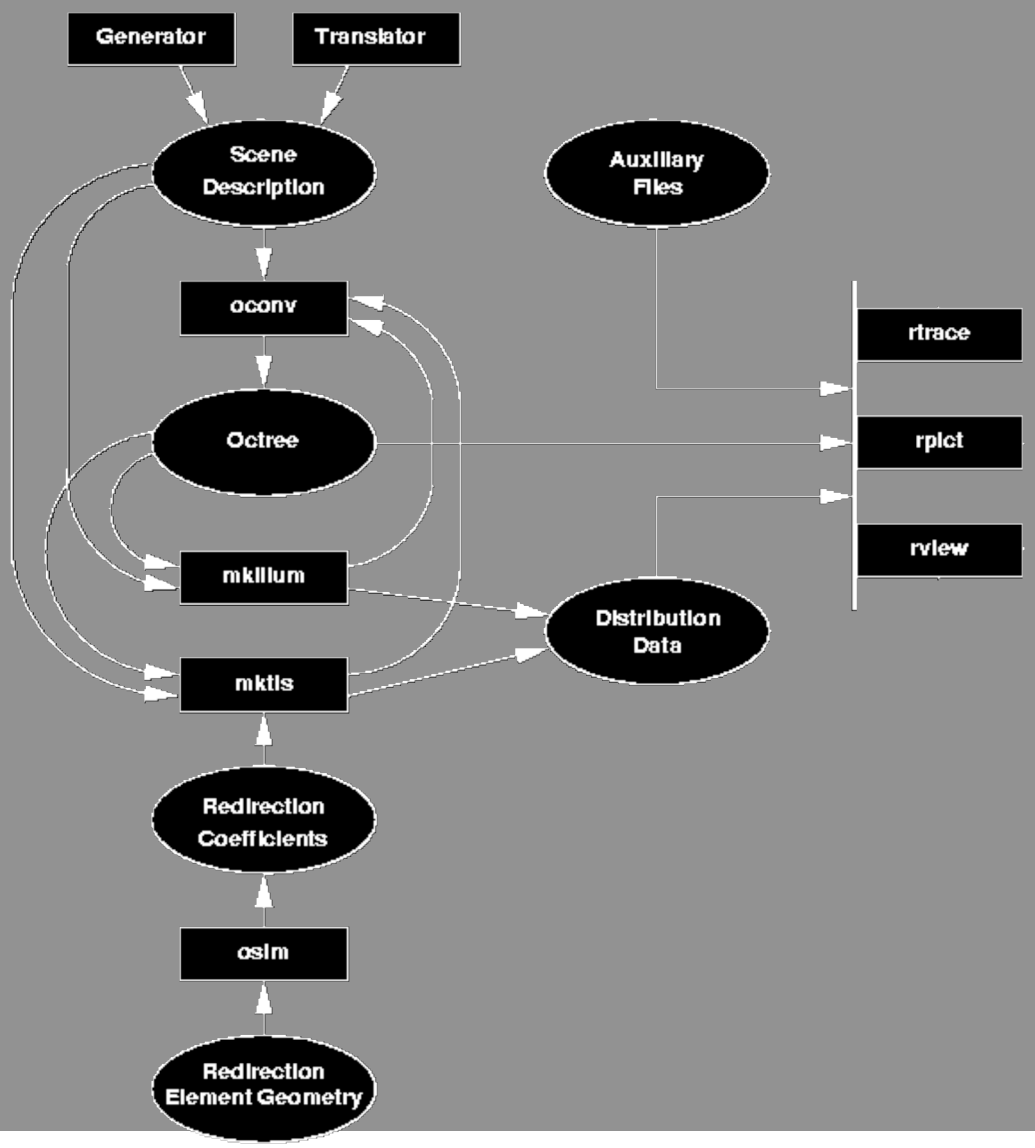
- Profile Based Systems
  - Mirror Reflection
  - Refractive
- Between Glazing
- Interior Systems

Simulation Problems with Radiance



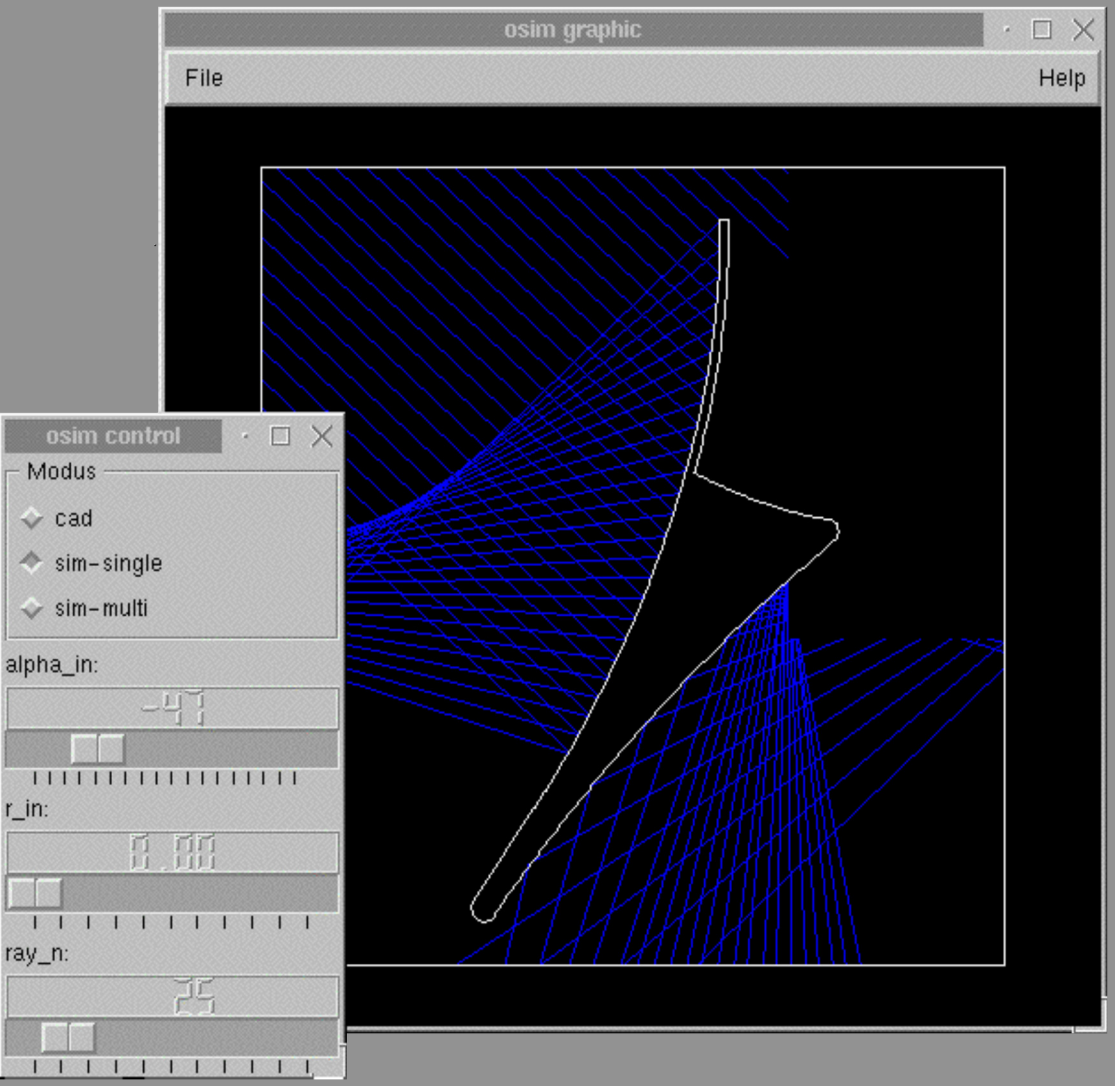
- Complicated Light Path
- Multiple Reflections/Refractions
- Jagged Output Distribution
- Sun Aiming Failures

Solution Approach to Simulation



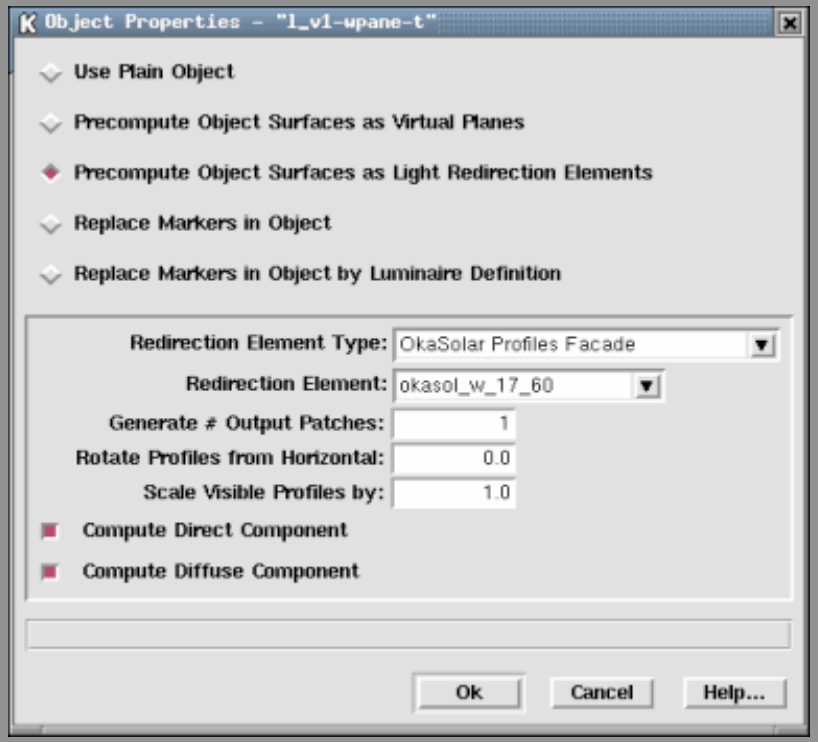
- Precalculation like Mkillum
  - Scan outer Hemisphere
  - Shoot for the Sun
  - Generate Output Distribution
- Takes Obstruction Into Account
- One-Time Computation

Preprocessing with Forward Raytracer



- Specify Profile Geometry
- Run Forward Raytracer
- Generate Output Distribution

Application of Data to Polygons



- Select Profile Type
- Select Profile Element (Angle)
- Set Parameters
  - Patches
  - Rotation from Horizontal
  - Geometry Scale
  - Direct Component
  - Diffuse Component

Running the Simulation

- Integrates as Easily as Mktis

Limitations of this Approach

- Averaging Over Window
- Requires -dj and -ds
- Disallows -ps
- Direct Luminance Inaccurate
- New Set of Artifacts
- Only Profile-Based Systems