# Learning the Best, From the Best

## A long-time newbie gets up to speed

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# Why Radiance?

- More materials / phenomena than Lumen Micro / AGI
- Scriptability
- Validated
- Flexible

# How Radiance?

- Binaries have made things easier

  http://radsite.lbl.gov/radiance/HOME.html

  http://dream.unipa.it/dream/pub/dot/anselmo/radiance/packages/
  http://puffin2.curtin.edu.au/restricted/mcminn/radiance-cdrom.shtml

- OS X - user friendly UNIX!

  http://www.apple.com/macosx

- Open Source - active mailing list

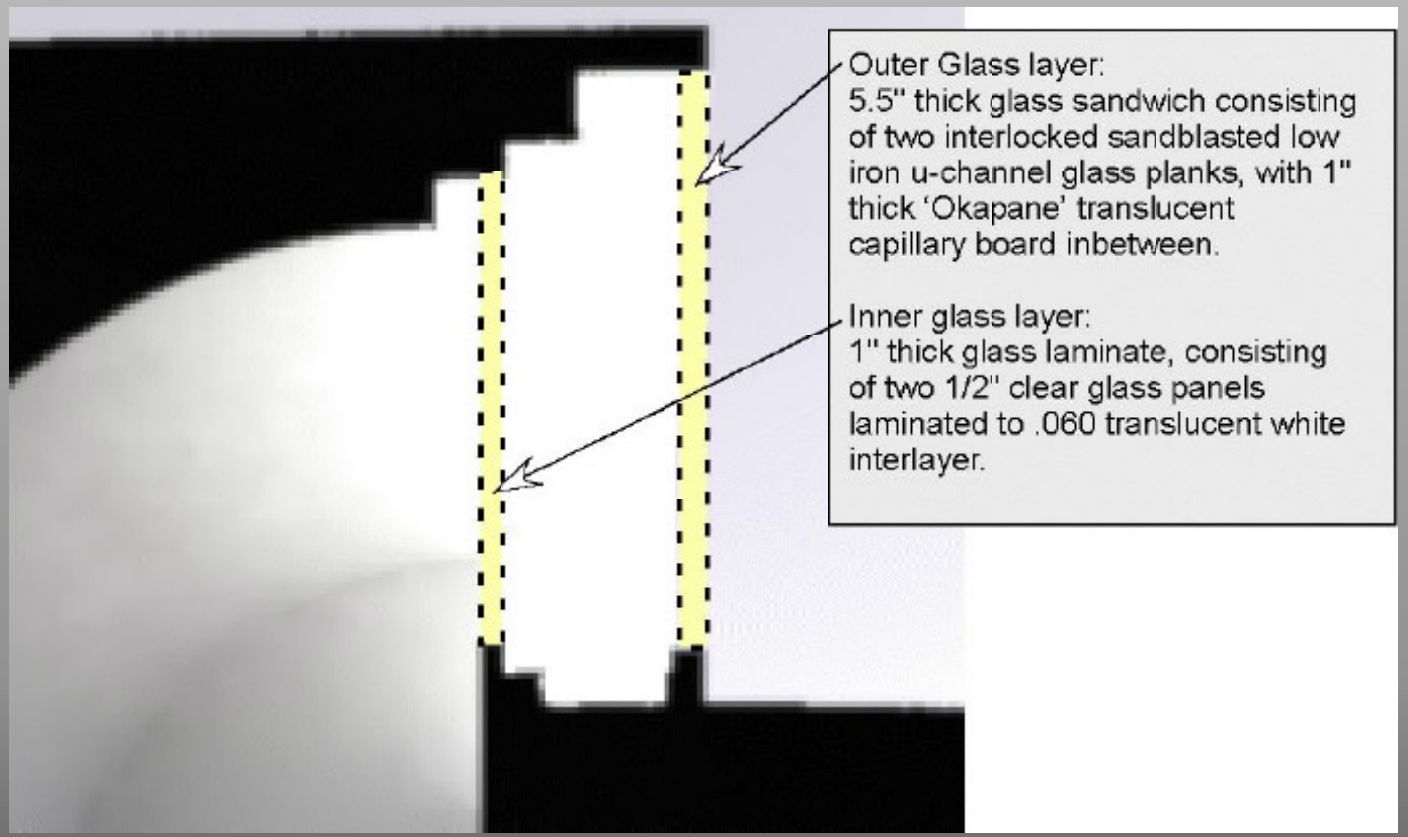
  http://www.radiance-online.org

# The climb up the curve

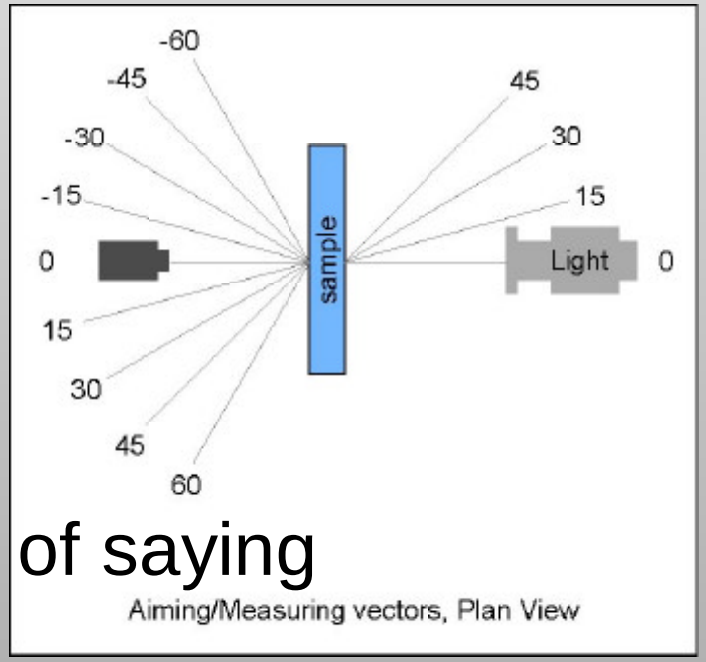
- “Discovered” Radiance in 1994
- Schorsch shows up in my inbox, 1996
- Greg Ward “returns”, 2001
- We buy a Powerbook
- Workshop 2002 - the last straw

# Application

- The Nelson-Atkins Museum of Art (Kansas City, MO, USA)
  - Complex space
  - Diffusely transmitting materials
  - We'd outgrown Lightscape

# Diving In...




- Greg Ward makes the mistake of saying "any help you need, just ask."

- We measure materials...

# Diving In...

- Generated time-lapse illuminance data sets
- Charts show max/min/avg illuminance in hourly snapshots
- Helped architect/client/lighting designer evaluate proposed shading systems and select shade density

Date, Weather: June 21, Clear Sky

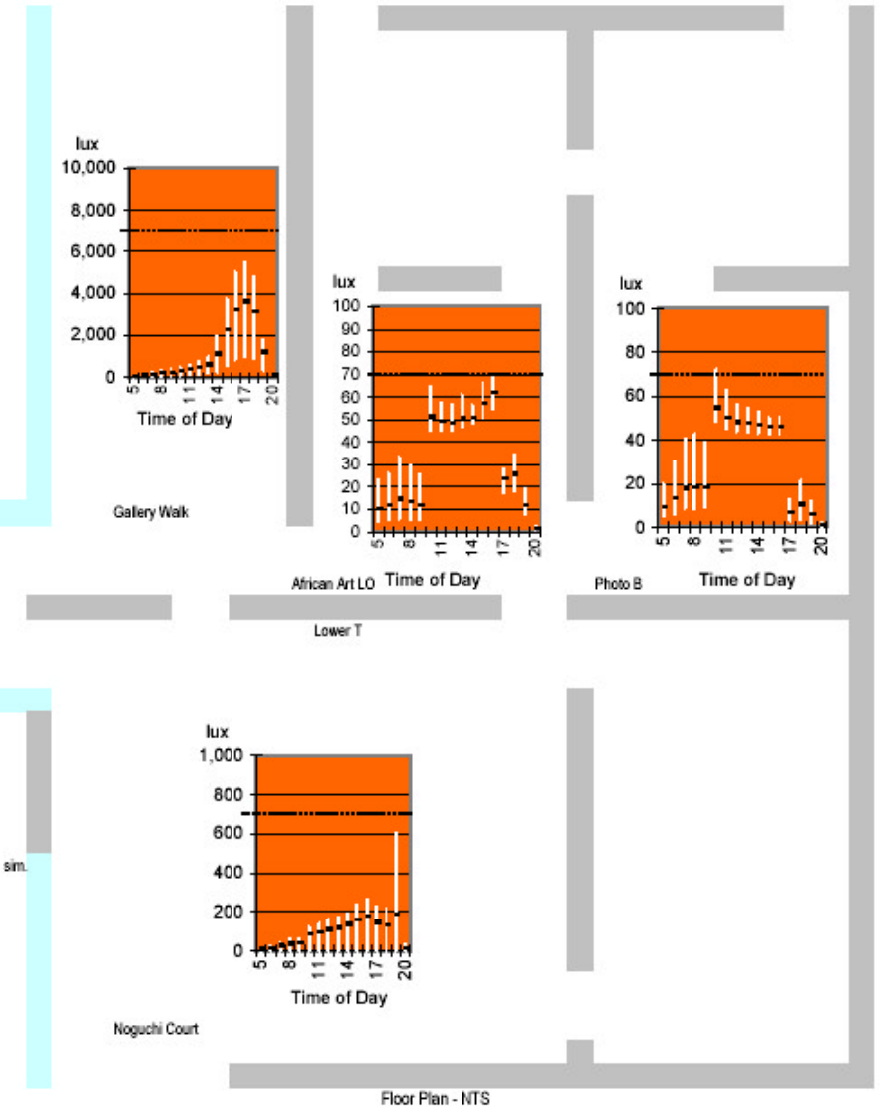
Shade Description: RUN18

Electric illumination level: 40 Lux

Illuminance (Lux)

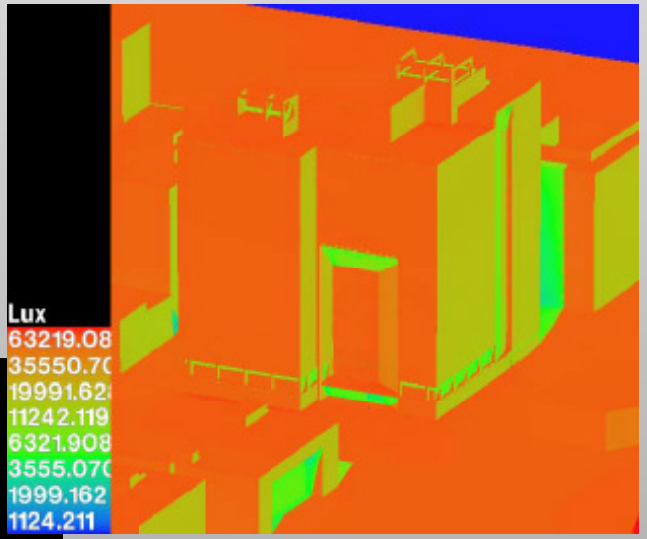
| | Hour | 05CST | 06CST | 07CST | 08CST | 09CST | 10CST | 11CST | 12CST | 13CST | 14CST | 15CST | 16CST | 17CST | 18CST | 19CST | 20CST | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EhExt | 2,435 | 10,282 | 29,105 | 46,594 | 61,601 | 73,124 | 81,279 | 86,040 | 84,883 | 78,847 | 69,510 | 56,761 | 40,802 | 22,652 | 6,172 | 1,649 | |
| Gallery Walk | EvGalWalk_N | 22 | 36 | 51 | 63 | 80 | 107 | 139 | 186 | 205 | 273 | 568 | 854 | 973 | 908 | 343 | 26 | |
| | EvGalWalk_MidN | 72 | 125 | 174 | 221 | 288 | 328 | 416 | 547 | 679 | 1,008 | 2,345 | 3,373 | 3,811 | 3,354 | 1,297 | 104 | |
| | EvGalWalk_MidS | 100 | 177 | 248 | 307 | 372 | 453 | 576 | 771 | 976 | 1,982 | 3,723 | 4,992 | 5,474 | 4,757 | 1,816 | 155 | |
| | EvGalWalk_S | 72 | 122 | 175 | 211 | 250 | 306 | 381 | 486 | 619 | 1,277 | 2,392 | 3,706 | 4,230 | 3,620 | 1,391 | 114 | |
| African Art HI | EvExt_N | 6 | 7 | 7 | 7 | 6 | 46 | 46 | 46 | 46 | 49 | 54 | 61 | 25 | 25 | 11 | 1 | |
| | EvExt_E | 4 | 5 | 6 | 5 | 5 | 45 | 45 | 46 | 46 | 50 | 50 | 54 | 22 | 21 | 8 | 1 | |
| | EvExt_S | 58 | 72 | 80 | 58 | 57 | 89 | 88 | 86 | 82 | 86 | 88 | 90 | 42 | 94 | 47 | 6 | |
| | EvExt_W | 6 | 7 | 9 | 9 | 8 | 47 | 46 | 46 | 46 | 48 | 50 | 55 | 18 | 18 | 8 | 1 | |
| African Art LO | EvAArtB_N | 6 | 7 | 8 | 7 | 7 | 46 | 46 | 47 | 47 | 49 | 56 | 62 | 27 | 26 | 11 | 1 | |
| | EvAArtB_E | 5 | 5 | 6 | 5 | 5 | 45 | 45 | 45 | 47 | 49 | 57 | 62 | 23 | 25 | 10 | 1 | |
| | EvAArtB_S | 23 | 26 | 33 | 30 | 26 | 64 | 57 | 57 | 61 | 58 | 66 | 70 | 28 | 34 | 19 | 3 | T |
| | EvAArtB_W | 8 | 10 | 12 | 13 | 10 | 49 | 47 | 46 | 47 | 48 | 51 | 55 | 18 | 19 | 8 | 1 | |
| Photo B | EvPhotoB_N | 5 | 7 | 9 | 9 | 9 | 49 | 46 | 46 | 46 | 46 | 46 | 46 | 6 | 8 | 4 | 1 | |
| | EvPhotoB_E | 8 | 10 | 13 | 13 | 12 | 50 | 48 | 46 | 46 | 45 | 45 | 45 | 6 | 9 | 5 | 1 | |
| | EvPhotoB_S | 20 | 30 | 41 | 43 | 39 | 72 | 62 | 56 | 54 | 53 | 50 | 50 | 13 | 21 | 12 | 2 | T |
| | EvPhotoB_W | 5 | 6 | 9 | 8 | 12 | 48 | 45 | 44 | 43 | 43 | 43 | 43 | 3 | 4 | 2 | 1 | |
| Noguchi Court | Noguchi_N | 9 | 20 | 29 | 43 | 44 | 114 | 121 | 142 | 154 | 169 | 193 | 198 | 147 | 121 | 56 | 9 | T |
| | Noguchi_E | 13 | 22 | 35 | 44 | 53 | 109 | 115 | 142 | 149 | 187 | 238 | 257 | 210 | 187 | 84 | 14 | |
| | Noguchi_S | 13 | 24 | 40 | 57 | 62 | 122 | 139 | 158 | 173 | 192 | 220 | 260 | 229 | 221 | 603 | 34 | |
| | Noguchi_W | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | deleted from sim. |
| Lower T | Tee@Gallery_Walk | 42 | 64 | 86 | 96 | 116 | 180 | 213 | 258 | 309 | 528 | 936 | 1,434 | 1,585 | 1,453 | 572 | 49 | T |
| | Tee@Lens_end | 70 | 113 | 171 | 174 | 211 | 307 | 356 | 459 | 570 | 1,042 | 1,513 | 1,650 | 1,663 | 1,974 | 823 | 80 | T |
| | L4T_S_W | 44 | 65 | 117 | 122 | 171 | 401 | 625 | 773 | 833 | 935 | 1,164 | 1,240 | 1,221 | 974 | 343 | 42 | T |
| Electrical Only | Electric | 0 | 0 | 0 | 0 | 0 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 0 | 0 | 0 | 0 | |
| | Electric | 0 | 0 | 0 | 0 | 0 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 0 | 0 | 0 | 0 | |
| | Electric | 0 | 0 | 0 | 0 | 0 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 0 | 0 | 0 | 0 | |
| | Electric | 0 | 0 | 0 | 0 | 0 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 0 | 0 | 0 | 0 | |

electric light added in gallery spaces

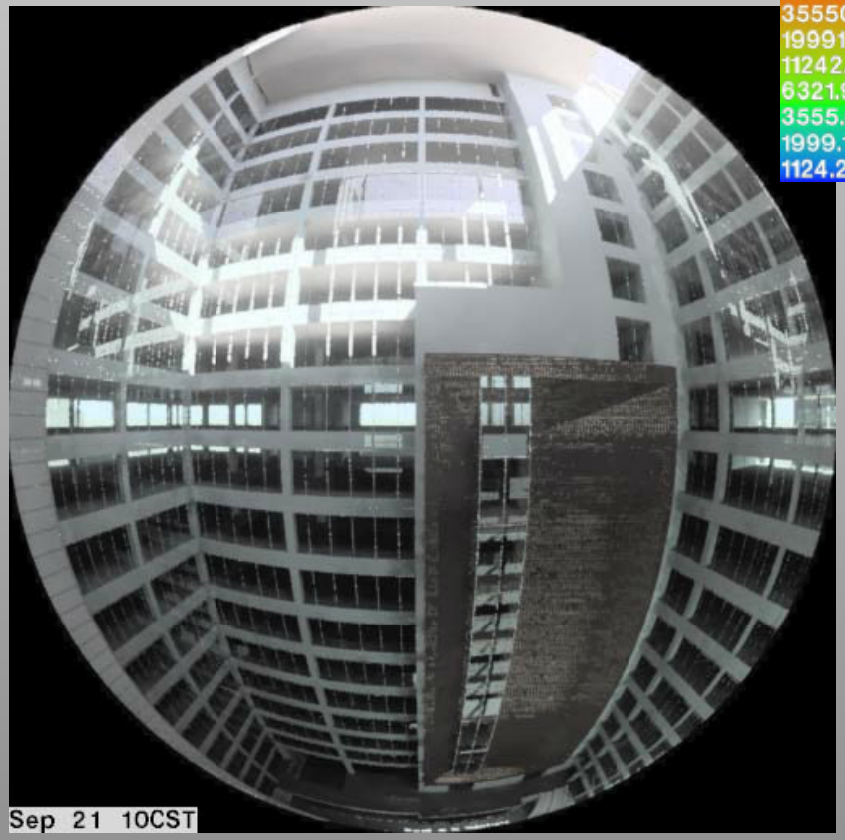


# Daylighting Analysis

- Introducing complexity...



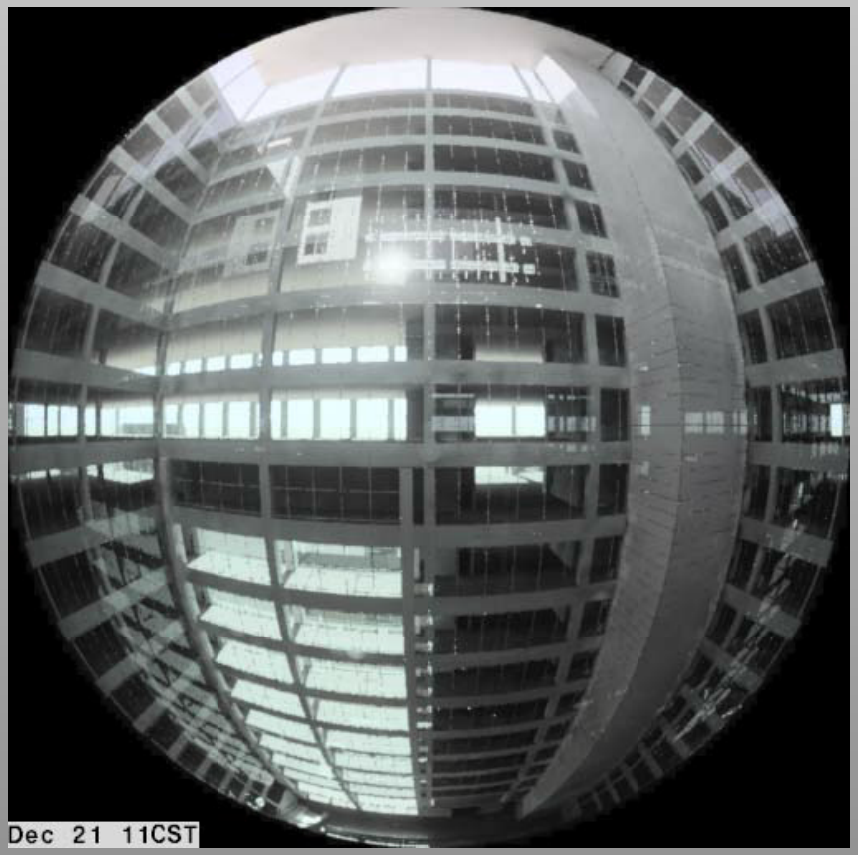


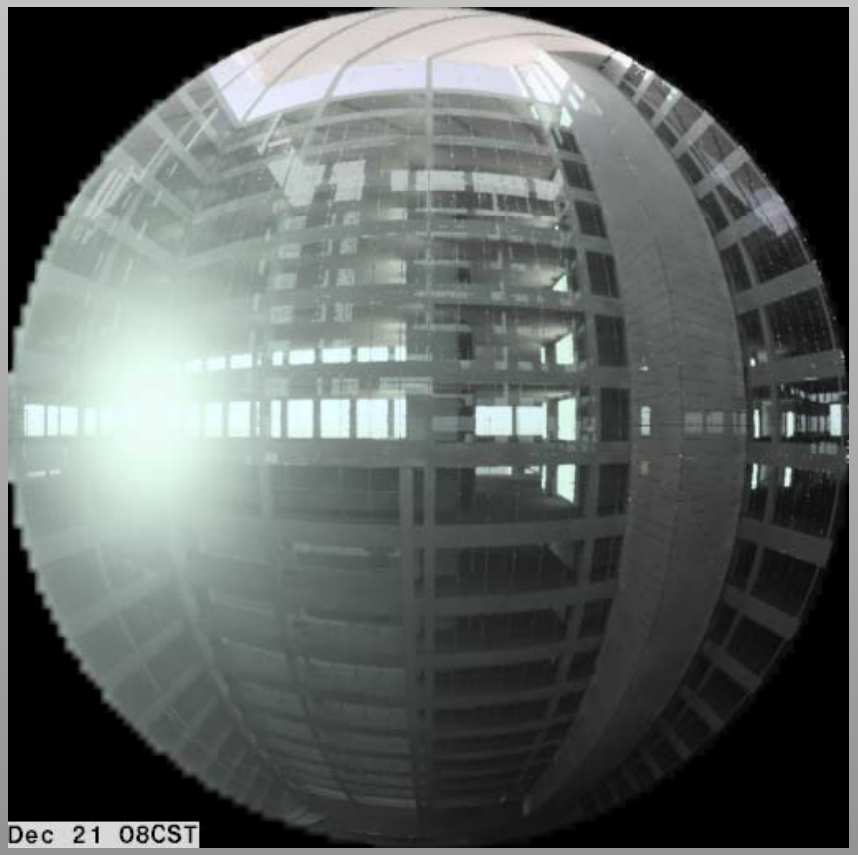



We learn how to compute falsecolor irradiance values on glass (which is a material normally ignored):
vwrays -x XRES -y YRES -vf viewfile -fd | rtrace -h -fd -opn octree | rtrace -fdc -I render_options -x XRES -y YRES octree > illum_picture.pic

# Daylighting Analysis

- Complex interactions & phenomena can be studied...



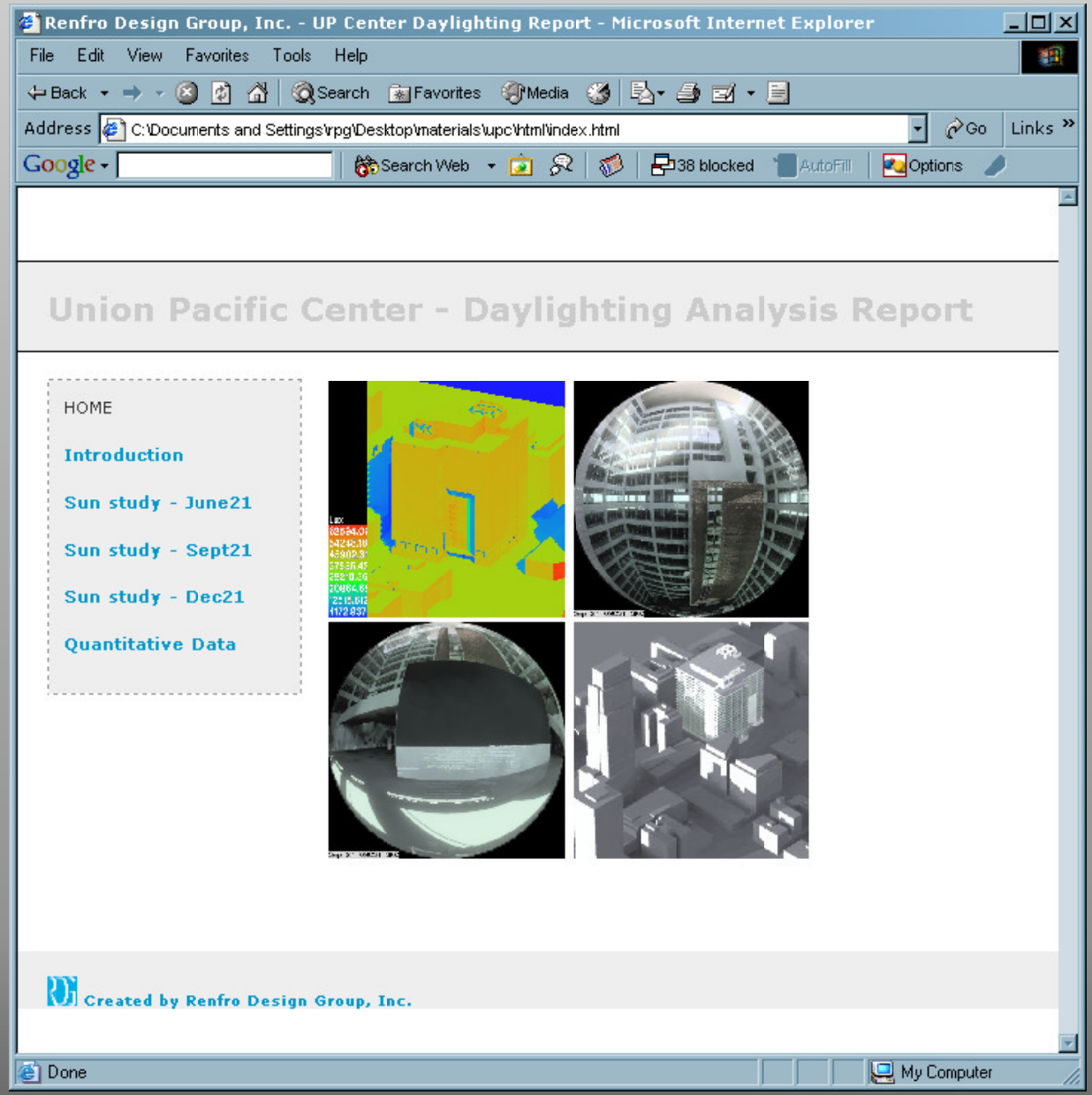



# Daylighting Analysis

- Reporting the results

html-based “website”, allowed for easy organization and sharing of data

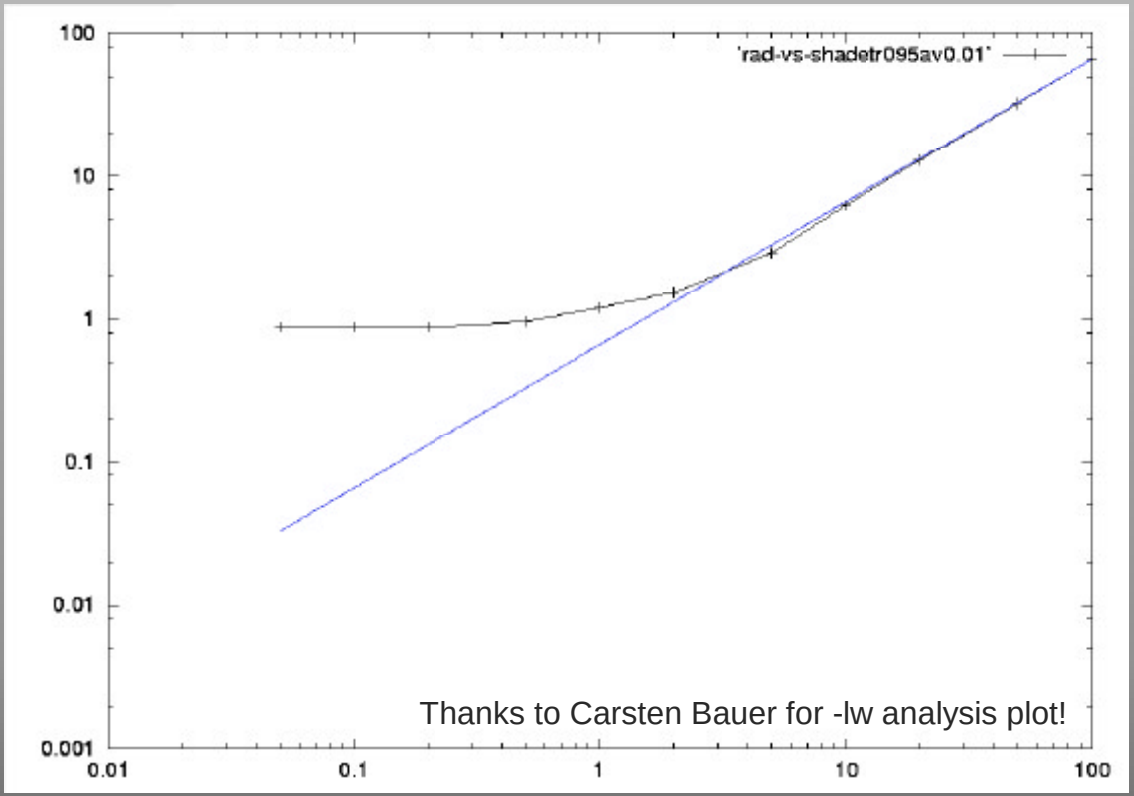
animations displayed inline with still images, summary info, and quantitative data



# Problems

- Limit Weight (-lw)

  Re-evaluating the dim gallery spaces of Nelson-Atkins, we encounter a problem where the default -lw parameter was “adding light”.



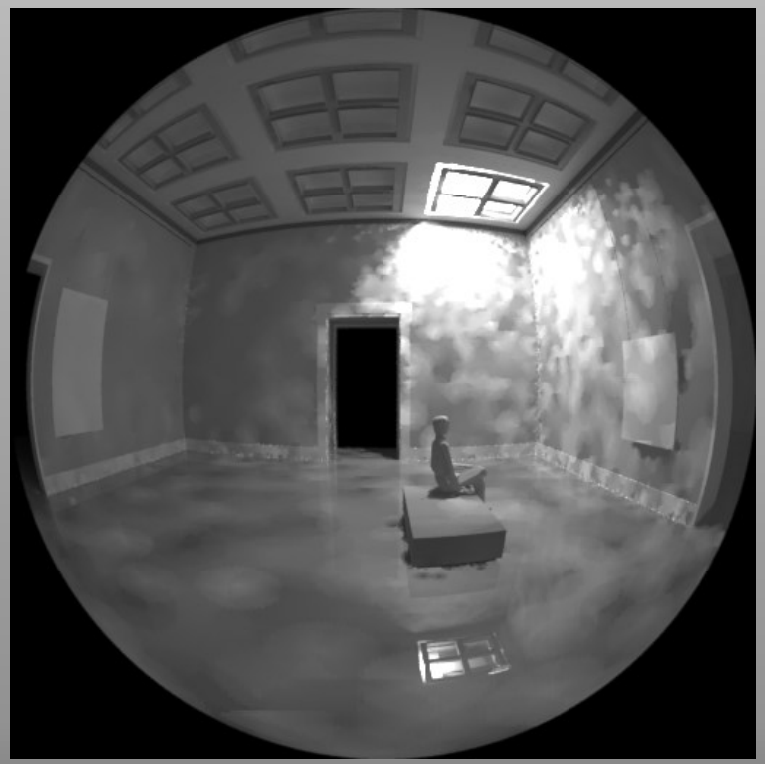
# Solutions

- “accuracy settings” must be very high for very low light level / daylight simulations
- Turn off -lw (-lw 0)
- Generate multiple fisheye views for ambient cache, prior to running point calcs

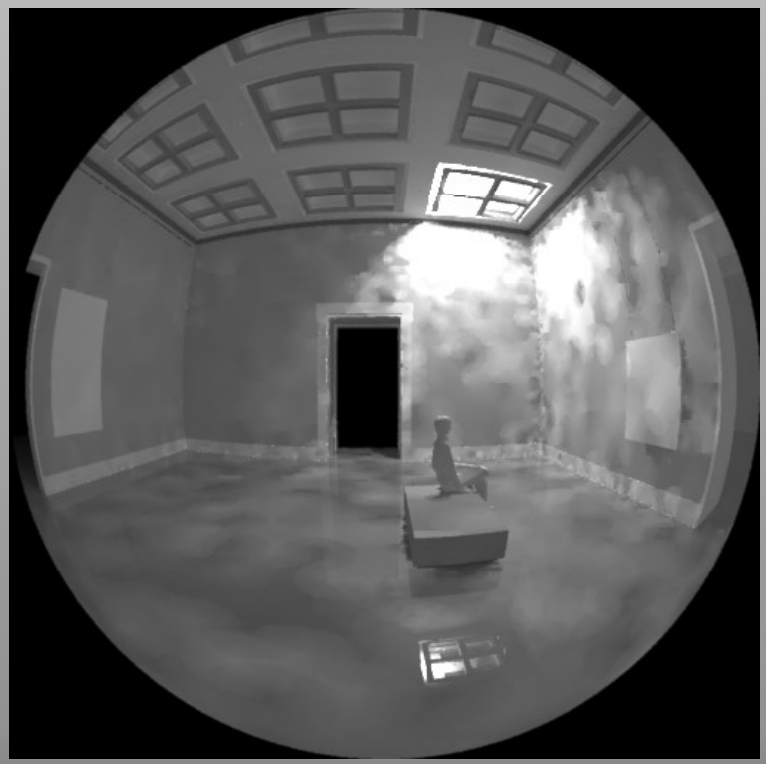
Thread available online:
http://www.radiance-online.org/pipermail/radiance-general/2003-May/000719.html
http://www.radiance-online.org/pipermail/radiance-general/2003-May/000732.html
http://www.radiance-online.org/pipermail/radiance-general/2003-May/000767.html
http://www.radiance-online.org/pipermail/radiance-general/2003-May/000772.html

# Problems

- Blotchies!
  - We (finally) master (?) the wonderful utility, mkillum
  - Relying on the indirect calculation was clearly not the way to go...

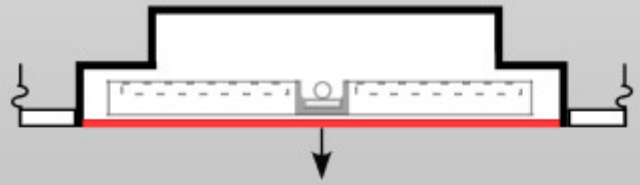


1 hour rendering

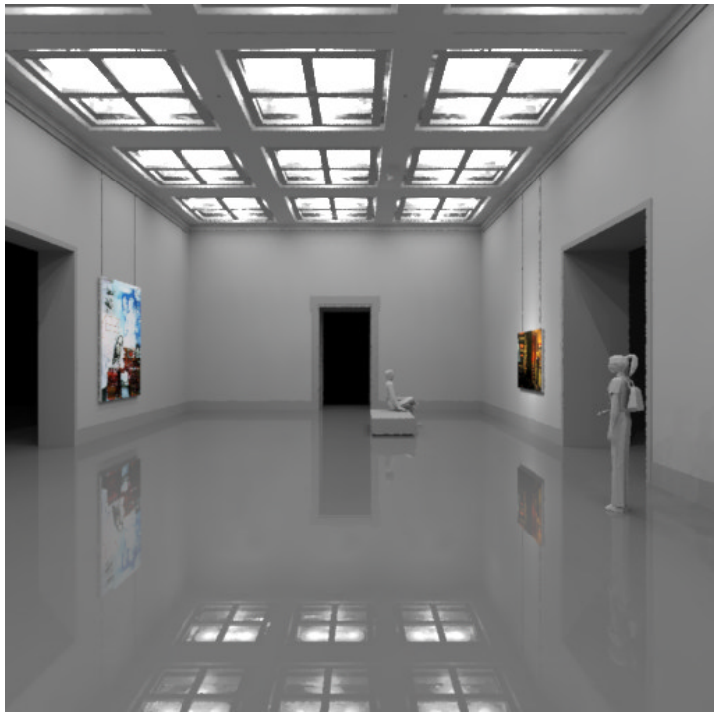


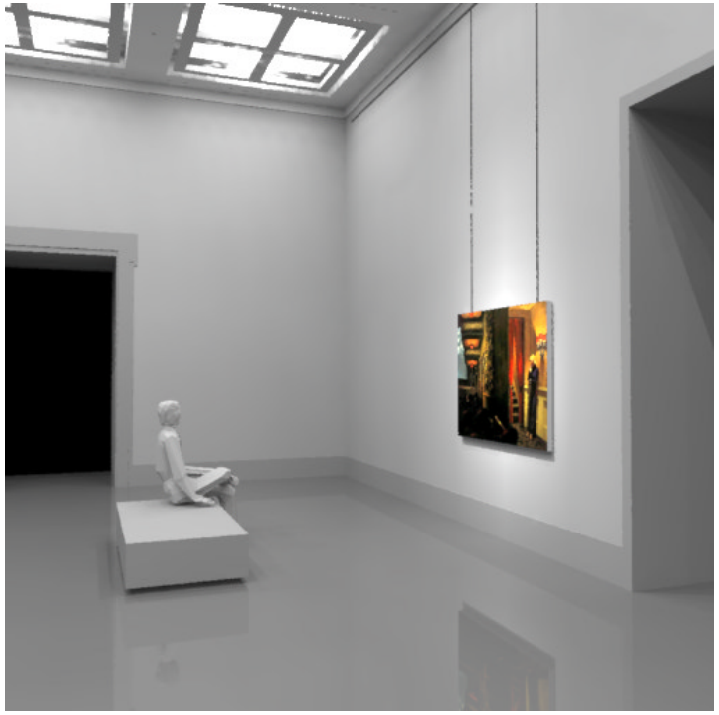
2 hour rendering

# Solutions



- mkillum to the rescue
  - move the coffer radiance into the direct calculation
  - massive improvement in shading, accuracy AND speed





these two renderings completed in 30 minutes
Thread available: http://www.rumblestrip.org/rad/rad_01.html

# Thank You!

- Radiance is a fantastic tool for anyone interested in the whims of light. It's a tool that can simulate a LOT of complex phenomena
- Radiance's ability comes at a price - a long road to mastery
- Radiance's user base is highly intelligent, yet generous with its collective intellect -- your questions will be answered, your luminous visions will be realized, you will be amazed. Download Radiance and start simulating reality!