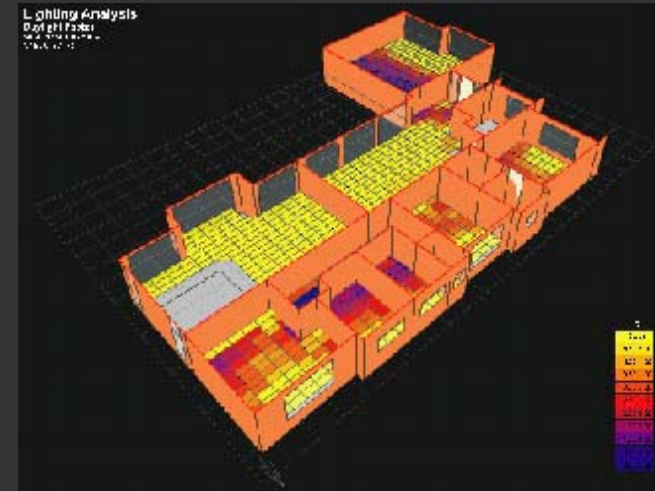
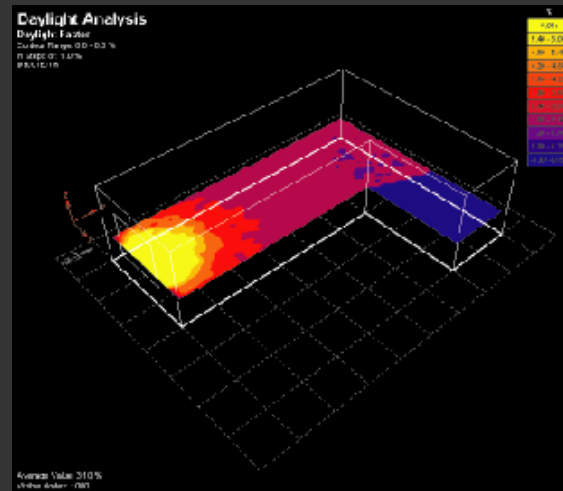
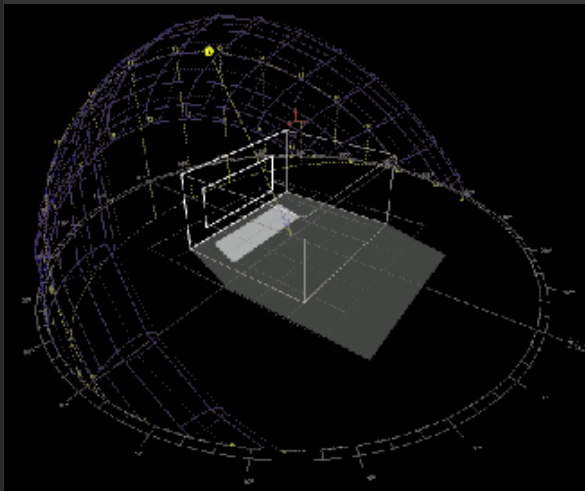


Natural Light in Design

using simulation tools to explore realistic daylight-responsive solutions



Massachusetts Institute of Technology IAP 2006 – 3 day Workshop

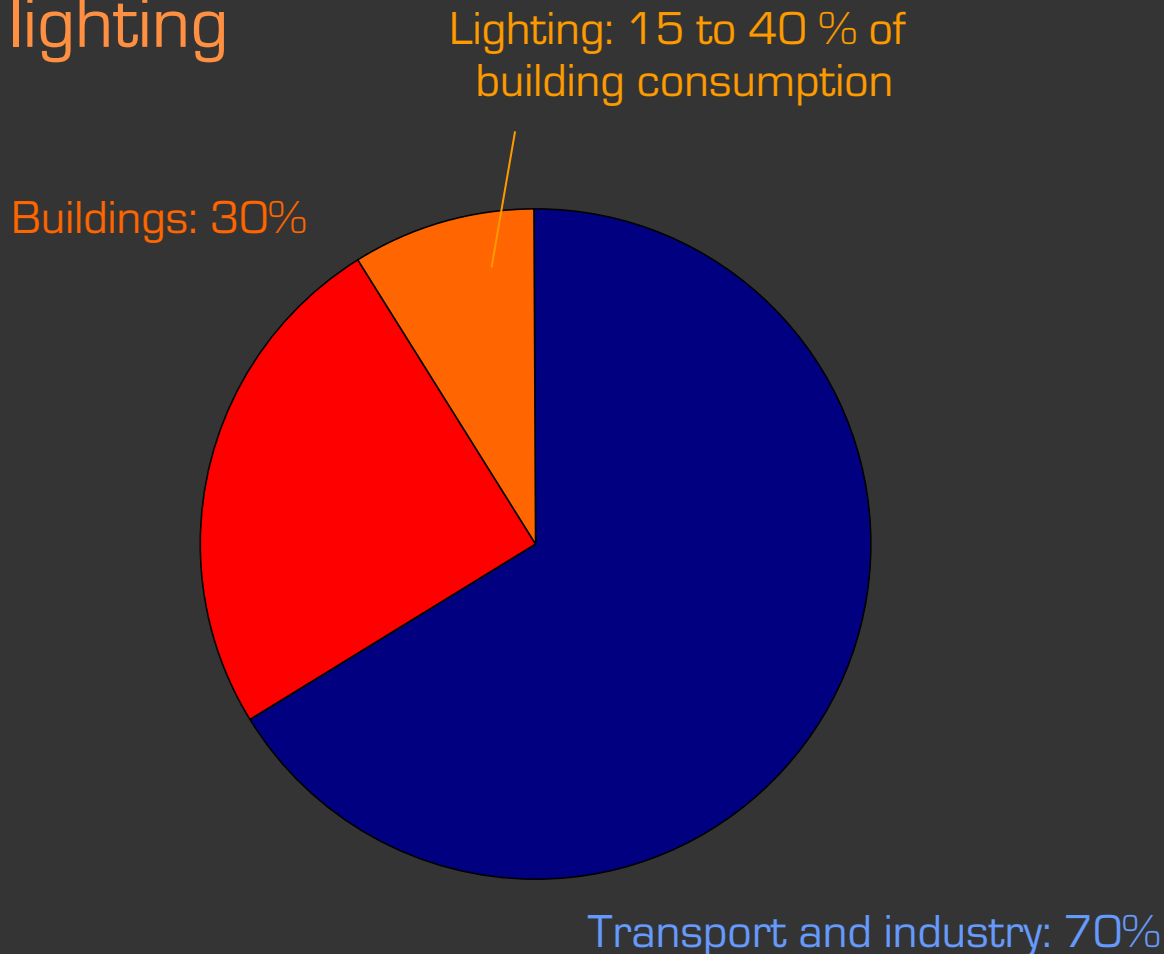
Course objectives

- ▶ Daylighting as a design criterium
- ▶ Ecotect, Daysim and Radiance as a tools-set to carry out daylighting analyses
- ▶ Understand and practice traditional performance metrics (daylight factor, avoidance of direct sunlight)
- ▶ Include emerging metrics based on dynamic annual daylight simulations in analyses (daylight autonomy)
- ▶ Apply learnt concepts to a design project

Daylighting for sustainability

► Energy savings

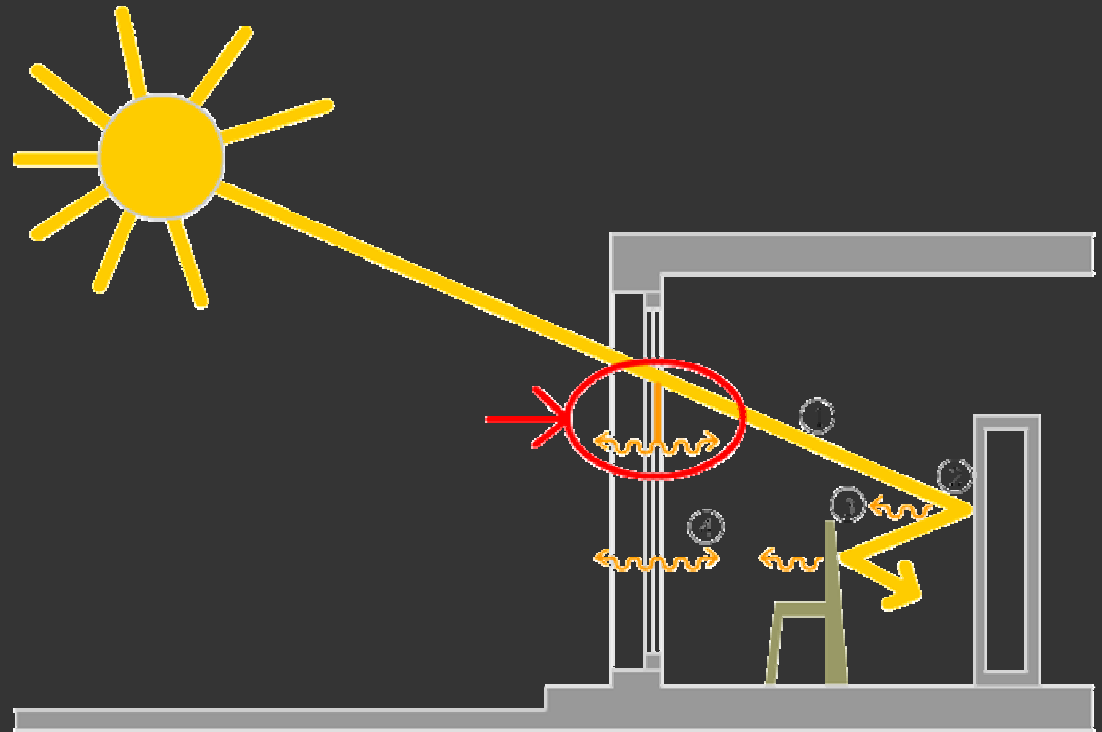
- electric lighting



Daylighting for sustainability

► Energy savings

- electric lighting
- solar gains management



Daylighting for sustainability

- ▶ Energy savings
- ▶ Visual comfort
 - aesthetical effects
 - color rendering

Daylighting for sustainability

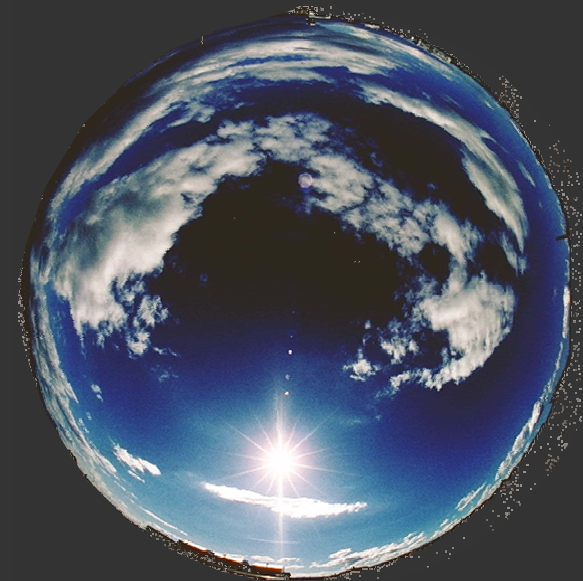
- ▶ Energy savings
- ▶ Visual comfort
- ▶ Connection to outside
 - view
 - biological needs

Daylighting for sustainability

- ▶ Energy savings
- ▶ Visual comfort
- ▶ Connection to outside
- ▶ Productivity

Daylight as a design factor

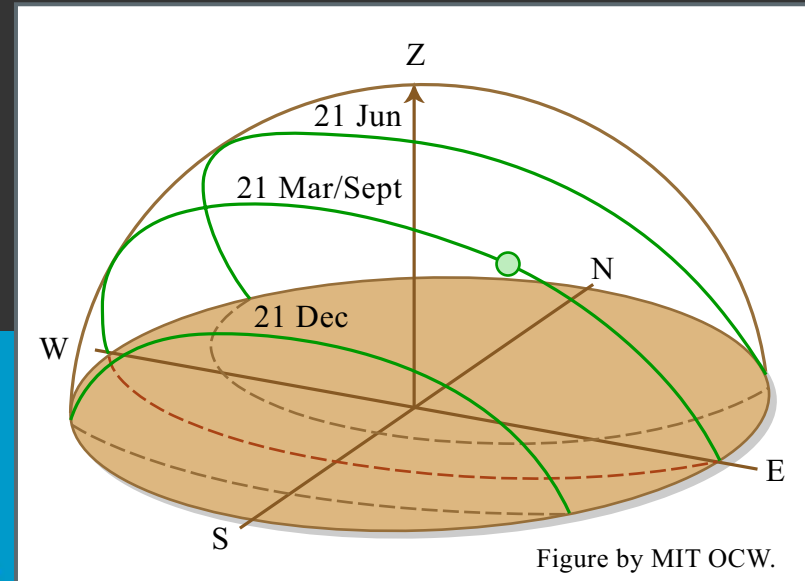
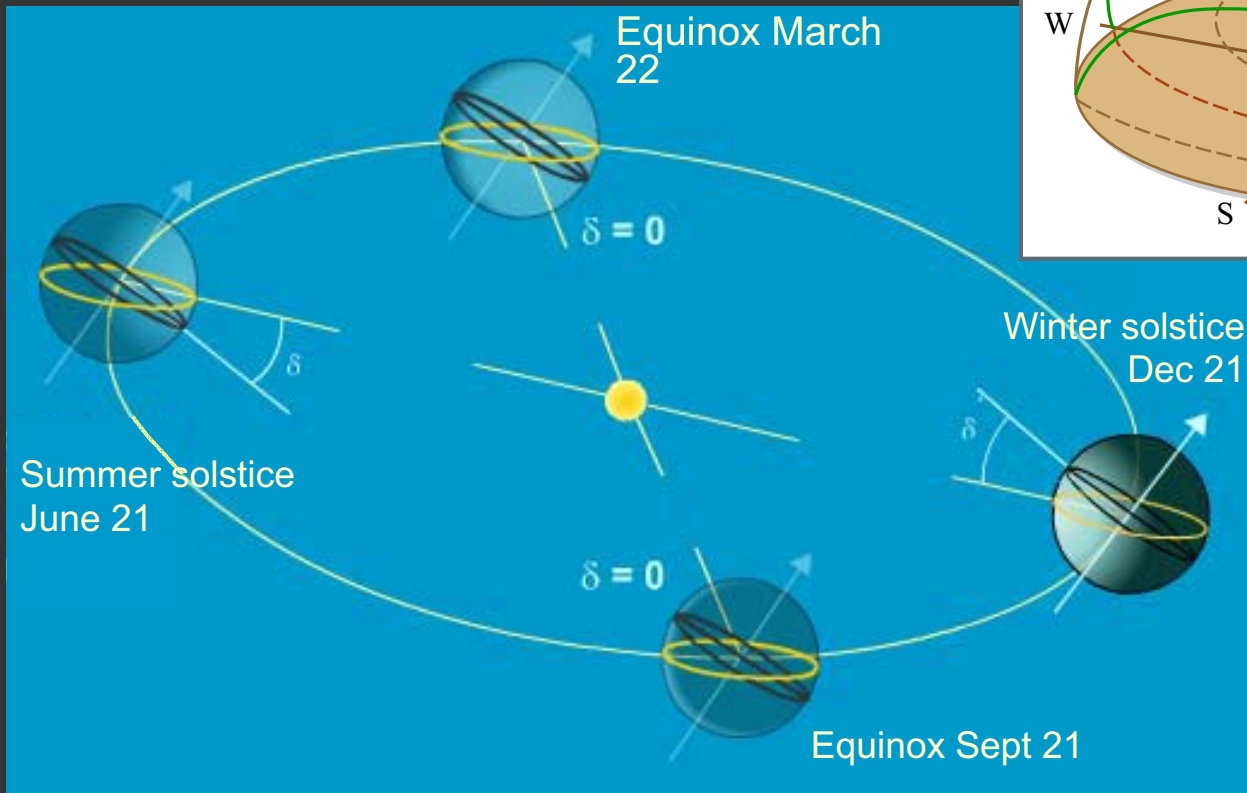
- ▶ Main parameters in daylight availability
 - Climate and weather



Daylight as a design factor

► Main parameters in daylight availability

- Climate and weather
- Sun course (latitude, time/date)



Daylight as a design factor

- ▶ Main parameters in daylight availability
 - Climate and weather
 - Sun course (latitude, time/date)
 - Sun access (orientation & mask)

Daylight as a design factor

- ▶ What do we want to do?
 - maximize daylighting, but avoid glare
 - maximize solar gains in winter
 - protection from solar gains in the summer and fall

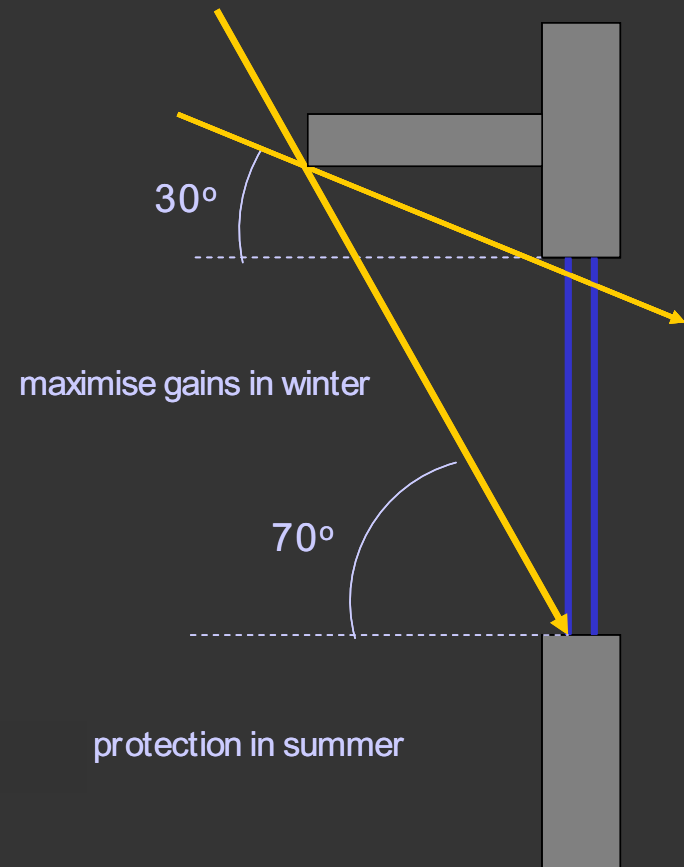
Daylight as a design factor

- ▶ How do we do it?
 - siting and orientation
 - sizing and positioning
 - openings
 - room depth

Daylight as a design factor

► How do we do it?

- siting and orientation
- sizing and positioning
- solar protections
 - fixed
 - mobile
 - orientation



Daylight as a design factor

► How do we do it?

- siting and orientation
- sizing and positioning
- solar protections
- glazing selection, framing



Daylight as a design factor

► How do we do it?

- siting and orientation
- sizing and positioning
- solar protections (fixed / mobile)
- glazing selection, framing
- indoor surface colors



Daylight as a design factor

▶ How do we do it?

- siting and orientation
- sizing and positioning
- solar protections (fixed / mobile)
- glazing selection, framing
- indoor surface colors
- advanced systems / materials

Daylighting case studies

- ▶ Berlin Reichstag
 - Norman Foster
- ▶ Genzyme Building
 - Behnisch & Behnisch
- ▶ Menil Collection, Workshop, Beyeler Foundation
 - Renzo Piano
- ▶ Kimbell Art Museum and Exeter Library
 - Louis Kahn

Daylighting case studies

▶ Collège La Vanoise, France

- Philippe Barbeyer

