Rendering 101

Visibility
Shading
Efficiency
Rendering 201

Realism
Analysis
Aesthetics
What Is The Goal?

• See rendering as a medium
  – Powerpoint slides
  – Pulped wood
  – Television
• The Medium is the Message
so match them:

Control the medium!
The Quest for Control

- Maturity = Control + Ability
- Rendering now:
  - Largely uncontrollable
  - Largely mechanical
- Control requires skill
The Goals

- Realism
- Analysis
- Aesthetics
The goal:

– Create a visual experience indistinguishable from a natural visual experience
Realism 2

- Move up the optic nerve
  - Right now: external
  - Stimulate internally
    - Retina
    - Optic nerve
    - Visual cortex
Realism 3

• Ex: Direct retinal stimulation
  – Cell processing
  – Saccades
  – Foveola
  – Glare, lens effects, etc.
Realism 4

• Moving up the optic nerve
  – Simulate all lower levels
  – Motor sensations and visual input
• How to get there:
  – Direct stimulation devices
  – Higher-level vision models
  – Motor sensing devices
The goal:

- Predict patterns of light transport and accumulation
Analysis 2

- Light prediction
  - Architecture
  - Farming
  - Engineering
- Meant for computer analysis
  - Not much perceptual work
Analysis 3

• How to get there:
  – Measured physical data
  – Natural phenomena
    • Wind, clouds, space dust
  – Parallel processing
Aesthetics 1

• The goal:
  – Creative expression of widely diverse visual points of view
Aesthetics 2

• Abstraction
  – What is left out
• High-level controls
• Low-level controls
  – Requires expertise
Aesthetics 3

• Perception matters a lot
  – It’s all communication
  – Channel clarity
  – Selective ambiguity
  – Prediction of sensation
Aesthetics 4

• Technique requires skill
  – Knowledge
  – Experience
  – Control
  – Predictability
Aesthetics 5

• How to get there:
  – Control focus
  – Specify looks, not mechanics
  – Feeling over technique
  – Modeling must be matched
The Future

• Freely mix synthetic & real
• Natural-feeling experience
• The message dominates
• Enhanced vision
  —“We have the technology”
Conclusions

- Big problems remain!
- Direct stimulation
  - Match synthesis to perception
- Artistic expression
  - Predict audience awareness