Geo-Based 3D Modeling and Visualization

Alexander C. Schreyer M.A.Sc., Dipl.-Ing.
Building and Construction Technology (ECO),
Architecture+Design,
University of Massachusetts, Amherst

A Romantic View
Visualization in Architecture

Visualization in Engineering
Visualization in Engineering

Issues with Visualizations
Available Tools

• 3D Modeling:
  – SketchUp, Rhino, 3ds max, AutoCAD, ...
  – Domain-specific: Revit, Inventor, Catia, ...

• Rendering:
  – VRay, Mental Ray, ...

• Interactivity:
  – Google Earth, Unity 3D, ...

• Integrated Analysis:
  – Ecotect, Vasari, FEM/CFD, ...

UMass Campus in 3D
SketchUp’s Geo-Based Photo-Modeling Process

And / Or

Holdsworth Hall in 3D
The 3D Warehouse

What Can We Do With These Models?

• UMass Facilities Planning
• Student Orientation
• Studios
• Public Outreach
• ...

[Image of 3D warehouse models]

[Image of campus landscape]
Infrared House

[Image: Infrared visualization of a single family house]

Link: http://www.umass.edu/myfavoriteplaces

Umass Favorite Places

[Image: My Favorite Places @ UMass Amherst]

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Umass Favorite Places

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Result Visualizations

KMZ Content
Photorealistic Rendering

- Reflectivity, translucency, better materials, artificial lights
- CPU- or GPU-powered rendering
- Animations, interactivity possible
- Photographic issues:
  - Point of view / composition
  - Field of view
  - Lighting

Real-Time Rendering Example
Some Rendering Issues

Example: Time of Day / Sun Position

[Images showing summer and winter sun positions]
Example: Field of View

35 degrees

60 degrees

Interactive Visualization

Google Earth:
Example: Wind Turbines at UMass

Game Engines
Immersive Environments / Caves

Thank You! Questions?

Web: www.alexschreyer.net
Twitter: @alexschreyer
Local: Holdsworth Hall, Rm. 125