

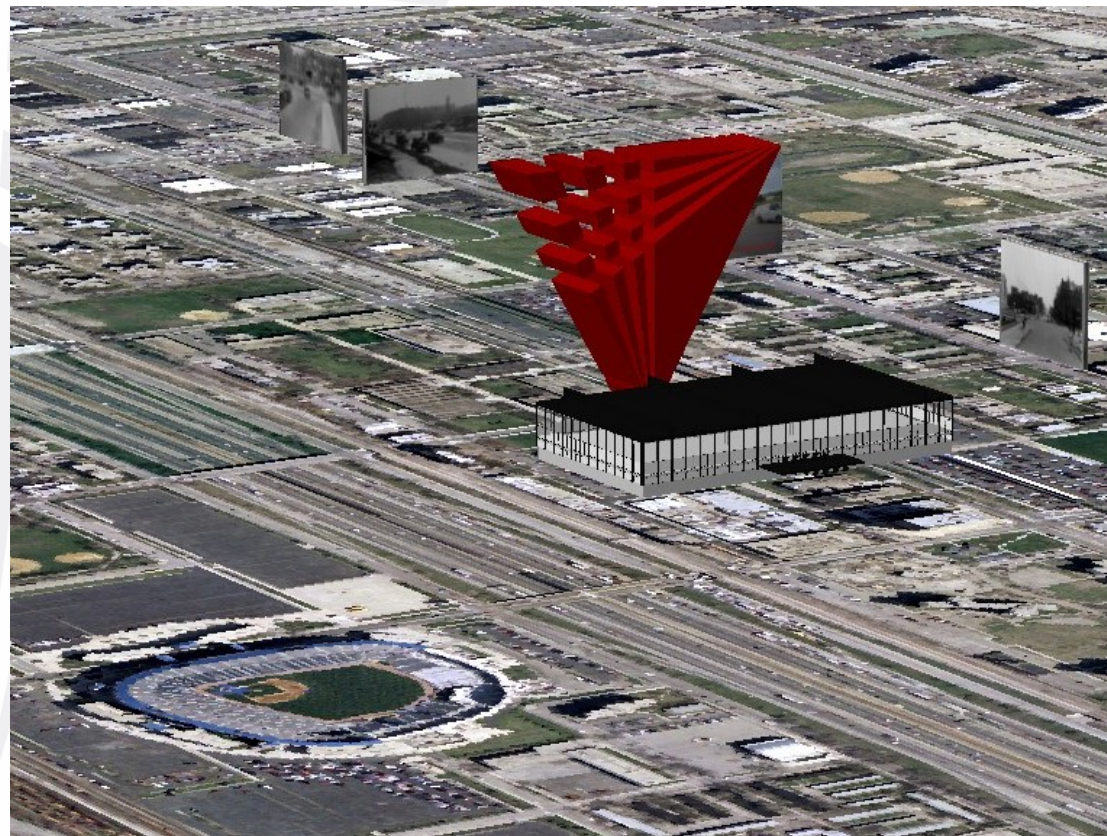


Custom 3D Markers for ESRI's Arcscene and ArcGlobe

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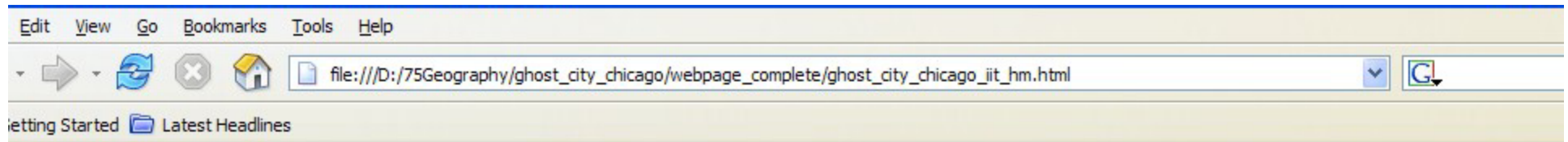
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- Challenged by IIT Humanities professor Kevin Harrington's vision of building a 4D model of Chicago that encompassed ***the horizontal extent, as well as vertical dimensions from bedrock to buildings, and a time dimension that could show sequential development***, faculty and students at the Illinois Institute of Technology(IIT) embarked on a multi-year program called **Ghost City Chicago**.
- The first phase of this effort used a traditional 3D modeling game engine program: Crystal Space.
- Two years of work:
 - North Michigan Ave (v1) -- IIT Campus (v2)



Ghost City: Computer Graphic Reconstruction of Chicago

ceived and directed by Kevin Harrington, Professor of Architectural History, this project will create computer-aided multimedia showing the city of Chicago at any time in the past. Making the growth of the city visible will permit viewers to discover what it was like to be alive at anytime in the city's history--from Indian encampment to highrise development. This presentation will be visual--providing the ability to see differences in light levels during different kinds of air quality or different kinds of artificial illumination (candle, lamp, gas or electric light), and it will also be aural, providing indications of sound, whether from the livestock near the stockyards, ships moving in the river, or singing hymns sung in a church, or the sound of workers walking at a shift change.

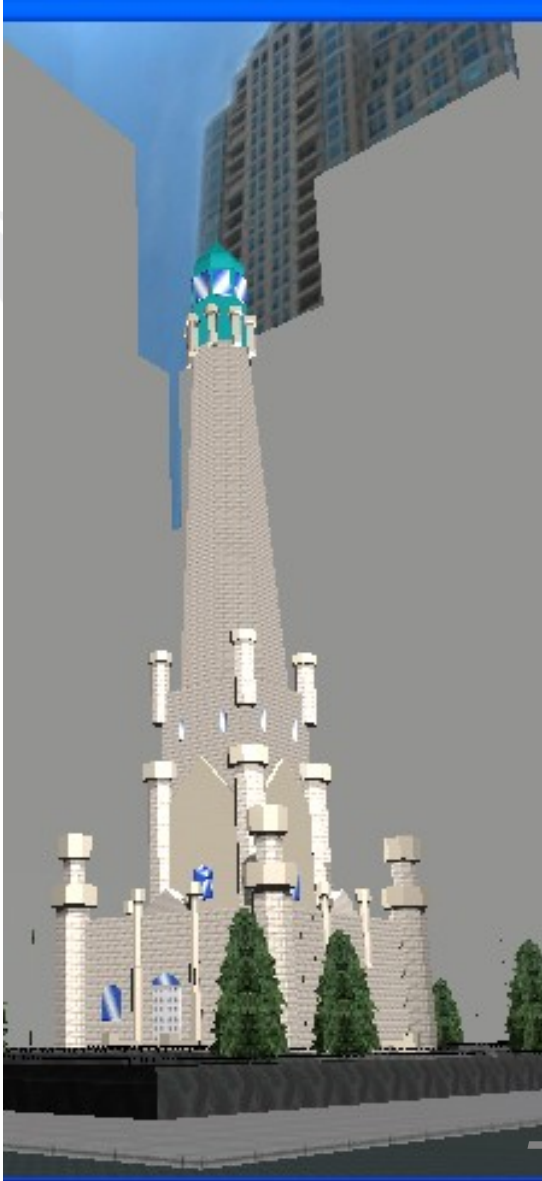
The viewer will be able to move anywhere in the city and enter any building or environment. It will be possible to see the water and sewer systems being extended across the prairie, and then see the opening of streets, followed by the construction of buildings (houses, apartments, shops, schools, churches) along the newly opened streets. It will be possible to shop at the department stores of the Loop, or visit one's doctor, dentist or attorney in a neighborhood.

In an early stage of this project, students in a course on "Chicago architecture and urbanism" developed several prototype solutions using destroyed but well documented buildings as the test subject.

Ultimately, this project will present Chicago in three dimensions:

| | |
|----------------------|---|
| Horizontal Dimension | The multimedia presentation will recreate the Chicago region at something like the scale proposed in the Plan of 1909, from Lake Michigan to the Fox River valley, from Kankakee north to the Wisconsin border. |
| Vertical Dimension | The presentation will allow viewers to visualize the city from its underlying bedrock, its watercourses, the variation in its topography, up through its buildings to their highest elevations, further up to include the approach paths of air traffic and the transmission patterns of the various radio, television and other electronic antennas. |
| Time Dimension | The geological forces that shaped the region should be visualized, from bed rock, to soils, to hydrology, to significant changes over time as they affect the site. This will provide a contextual basis for the subsequent human activities. All human use and transformation of the site should be incorporated if appropriate documentation exists, whether archeological, artifactual, or historical. |

In the initial stages, the project will keep the scale of material small enough to be understood yet big enough to suggest the problems and potential of the project. Thus, the set of buildings to be explored will belong to the ghost city--that group of well-documented, usually well-regarded buildings which have been destroyed, such as the Old Mission and the Mecca Flats (on the IIT campus) or the Francis Apartments and the Schiller Theater (in the city).



--v1(*crystal space*)

- To continue the effort, IIT's GIS capability, centered in the Galvin Library has taken a different approach, exercising ESRI's recently improved 3D programs.
- GIS capabilities lend themselves well to such a project that embraces geo-specific attributes, and the switching in and out of appropriate data layers.
- 3D adds to the richness of the viewing perspective.



An important capability in the recent software is the ability to make your own "**3D Markers**". Once these are built, they can be placed as required. Several import modes are available. (3ds; flt; vrml)

Two examples of the results using the campus buildings, overlaid on basemaps and aerial photography, as well as recent streetscape photos compared to images from 70 years ago....



Sample 1: model buildings

From the first phase of the project, several wireframe and texture covered models were available -- buildings from the IIT campus, including those designed by Mies Van Der Rohe.



These were converted and placed as "3ds" types.



Sample 2: picture boxes

- A more powerful method for adding data was developed using the VRML capability. Since there is a wealth of high quality photos available, a picture framing capability was implemented using custom "3d Marker Symbols".
- Requiring only a seedling VRML file, and a text editor; the rest of the integration and editing is done with the ESRI provided resources.
- Very different than the traditional hotlinking capability, leads to a powerful depiction that aims to fulfill the original objective.



To install custom 3d marker symbol:

- in arcscene, install (single) point layer_shapefile
- double click on marker properties
- select 3d marker symbols
- import; set or reset attributes


```
• VRML V2.0 utf8
• #
• # VRML file: C:\Documents and Settings\Antonio Callado\Meus documentos\01 -
  Projetos\Laurence\Michigan_Street\michigan_box_not_green.wrl
• #
• # Converted by the PolyTrans geometry converter from Okino Computer Graphics, Inc.
• # Date/time of export: 03/12/2005 01:54:23
• #
• # Bounding box of geometry = (-47.417,-32.703,-5) to (52.583,42.297,1.84886e-006).

• WorldInfo {
•   info "Gravity: off"
• }
• NavigationInfo {
•   headlight TRUE
• }
•   DEF Camera01 Viewpoint {
•     fieldOfView 0.785398
•     position -110.305 50.7027 215.724
•     orientation -0.40486 -0.90978 -0.09161 0.48754
•     description "Camera01"
•   }
•   Viewpoint {
•     fieldOfView 1.17601
•     position 10 10 10
•     orientation -0.59028 0.76927 0.2445 0.98786
•     description "default"
•   }

•   # Current light source name = defaultambient
•   # Ambient light source
•   PointLight {
•     ambientIntensity 1
•     on TRUE
•     color 0.192157 0.192157 0.192157
•   }

•   # Current light source name = Omni01
•   PointLight {
•     color 1 1 1
```

Vrml (.wrl) opened in wordpad



Vrml (.wrl) texture reference

- }
- texture ImageTexture {
- repeatS TRUE
- repeatT TRUE
- url "box4x5mich32.jpg"
- }
- textureTransform
- TextureTransform {



challenges & issues

- navigation-- “shift f1”
- 3ds models of campus took 10students a semester.
- picture box builds fast
- real-time performance
- orientation
- colors & see-through



Further...

- Templates:
- Laurence Rohter rohter@iit.edu
- John Dorr dorr@iit.edu
- Ghost City Chicago downloads:
- www.animagraph.com

Ewug v 2005nv11r