

# Urban Design Laboratory

## Model Composition and Development

City of Belfast, United Kingdom

Richard Sommer

Paul Cote



# Outline of Presentation

- Composition of the Model & Spatial Extension
- Applications: An Urban Design Investigation
- Presentation / Visualization of Alternatives
- Extending the Model Semantically
- Developing Relationships and Capabilities

# Belfast Model: Information Sources

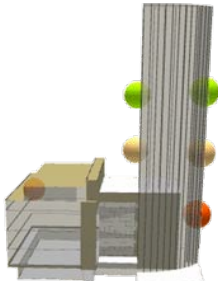


Planimetric Ground Cover (OSNI)  
Planimetric Buildings (OSNI)  
Aerial Photograph (Google Earth)

Building Heights (U.U. Sommer & Shaheen)  
3d Buildings from Google 3d Warehouse

- Albert Clock: (Inshore Surveys.com)
- Obel Tower: (PeterRam)

# Obel Tower View Studies



**View of Tower:**

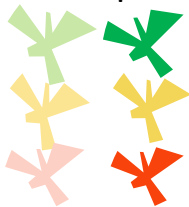
(Above)

**51 Meters**

**34 Meters**

**17 Meters**

Partial | Full



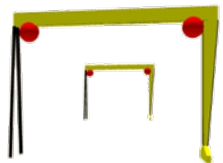
When finished, the Obel Tower will be 80 meters tall. How well will it perform as a landmark on the Belfast Skyline?

Building models shared on Google3d Warehouse:  
 Albert Clock by Inshore Surveys.com; Obel Tower by PeterRam

# View Corridors



## Crane Points



Number visible:



Belfast's has invested in preserving the shipyard cranes Sampson and Goliath. Will tall development projects threaten important landmark views? Consider transfers of development rights.

# They Move!

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## Two Cranes over Templemore



While looking down Templemore Avenue, I noticed that the Samson crane had moved up close and personal with Goliath (nearer town). I was only able to get one quick shot while the traffic lights were red, and Samson has now returned to the seaward side of the dock.

Uploaded on July 6, 2006  
by [NickyBe](#)

**NickyBe's photostream**

920 uploads

browse

This photo also belongs to:

**Images of Belfast (Set)**

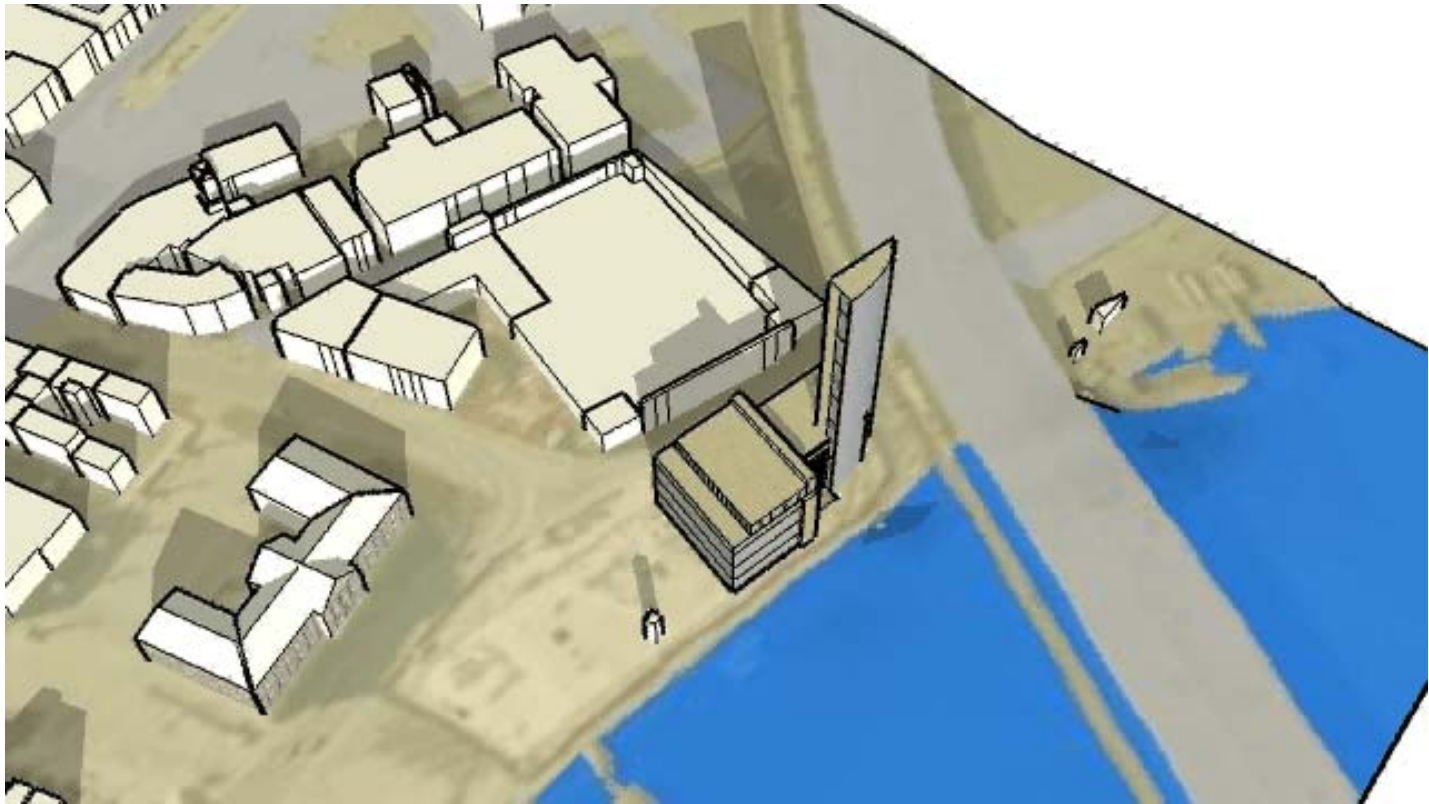
204 items

browse

**Samson & Goliath - Icons of Belfast (Set)**

45 items

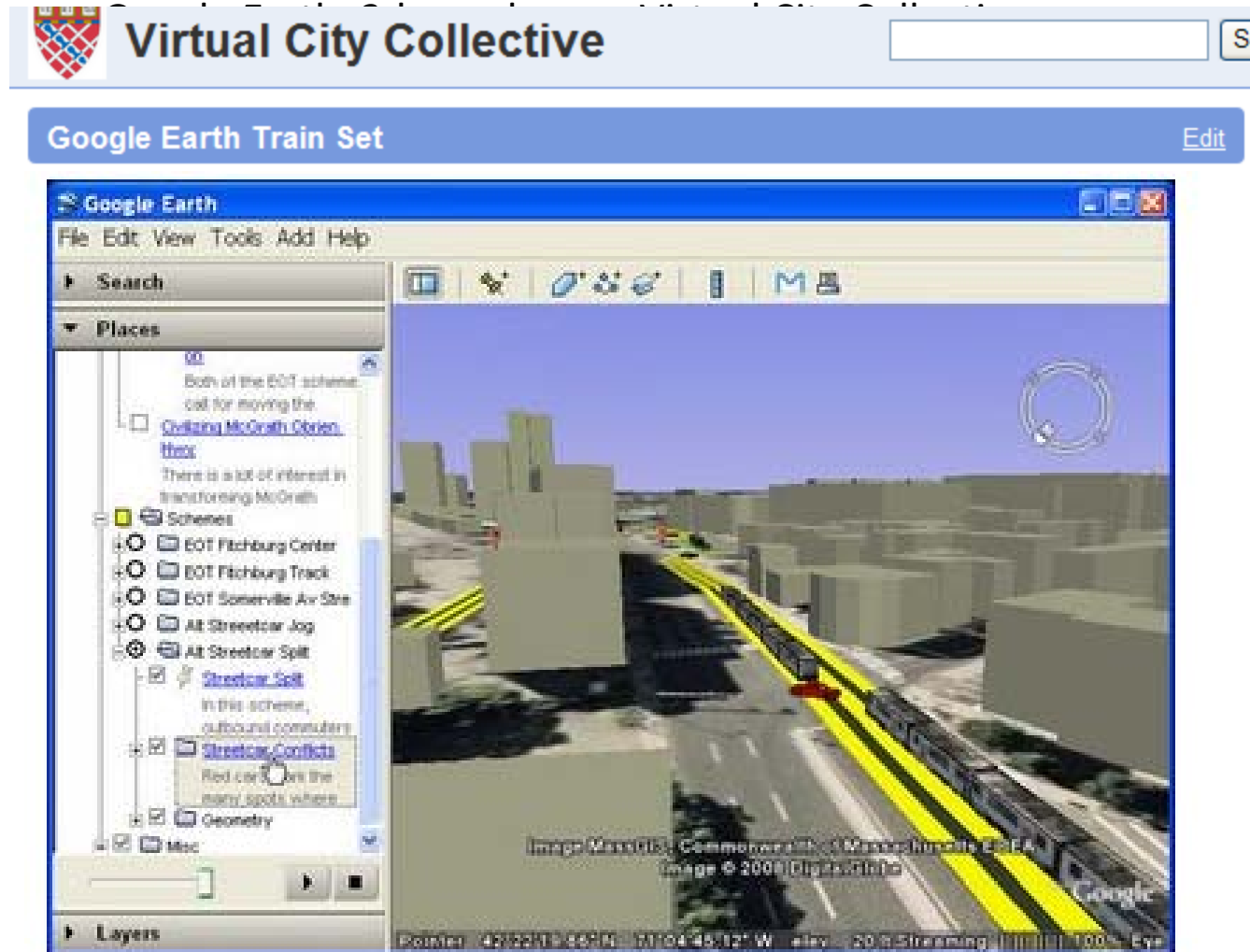
# Shadow Studies



Obel Tower Shadows 9:00 AM to 5 PM March 25<sup>th</sup>  
(Google Sketchup)

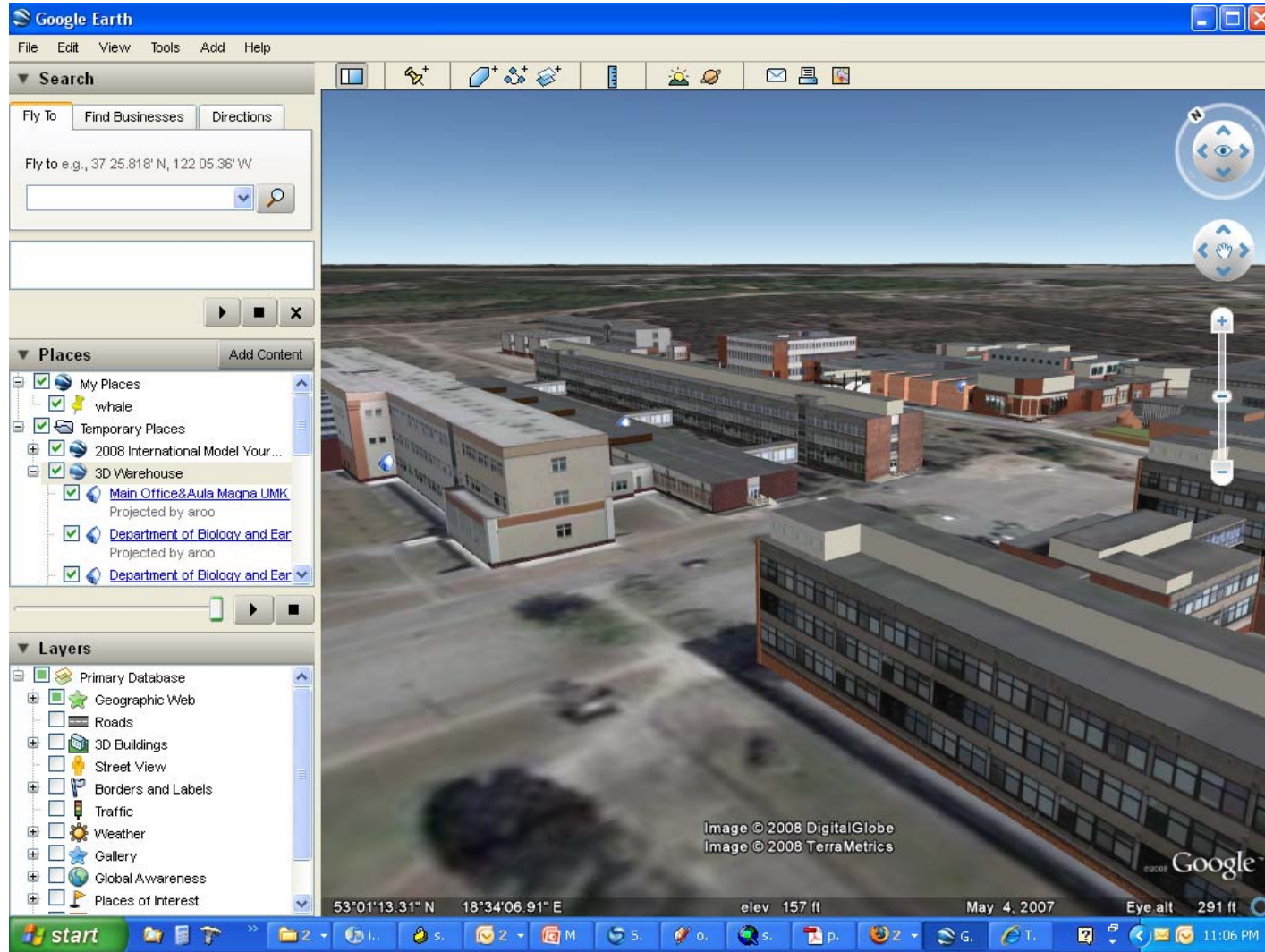
# Democratization of Urban Design Tools

- Community participation





# Google Model Your Campus Initiative



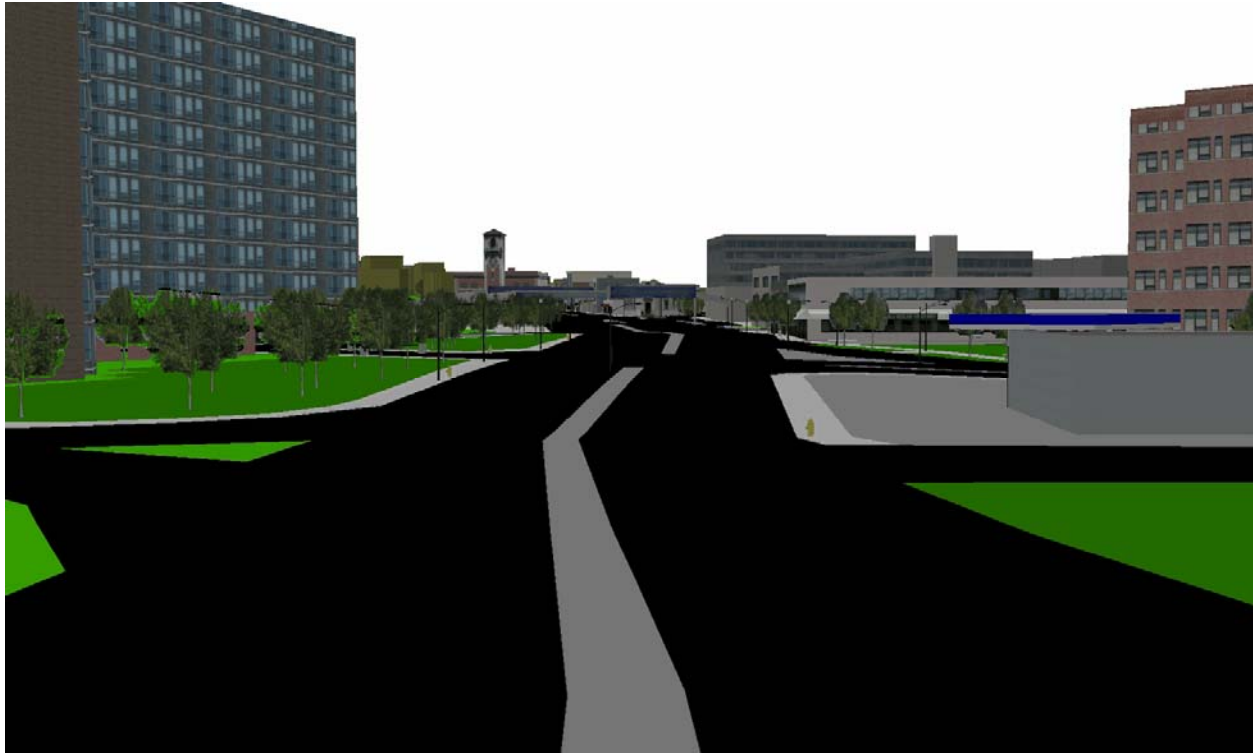
Nicholas Copernicus University,  
Winning Entry: Google Model Your Campus Competition

7/8/2009

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Paul Cote

# Articulated Site Studies



Better planimetric layers for ground cover, pavement, trees and street furniture may yield more evocative diagrammatic Portrayals. It would be possible to create more photorealistic Studies than this one using data from the GIS repository.

Model & rendering by Gary Smith, Green Mountain Geographics

# Community Sharing of 3d Model Assets

Standards for data exchange:

Collada, IFC, X3D

**BT Tower, Belfast, Ireland** by [archisurveys](#) Uploaded on December 3

Image | Map





[Download Model](#)

[View in Google Earth](#) ★ ★ ★ ★ ★ [See ratings and reviews](#)  
[Add this model to a collection...](#) 1 rating [Rate this model](#)

**Collections containing this model**

 [Rest of Ireland](#)

**Related items**

More models by [archisurveys](#):

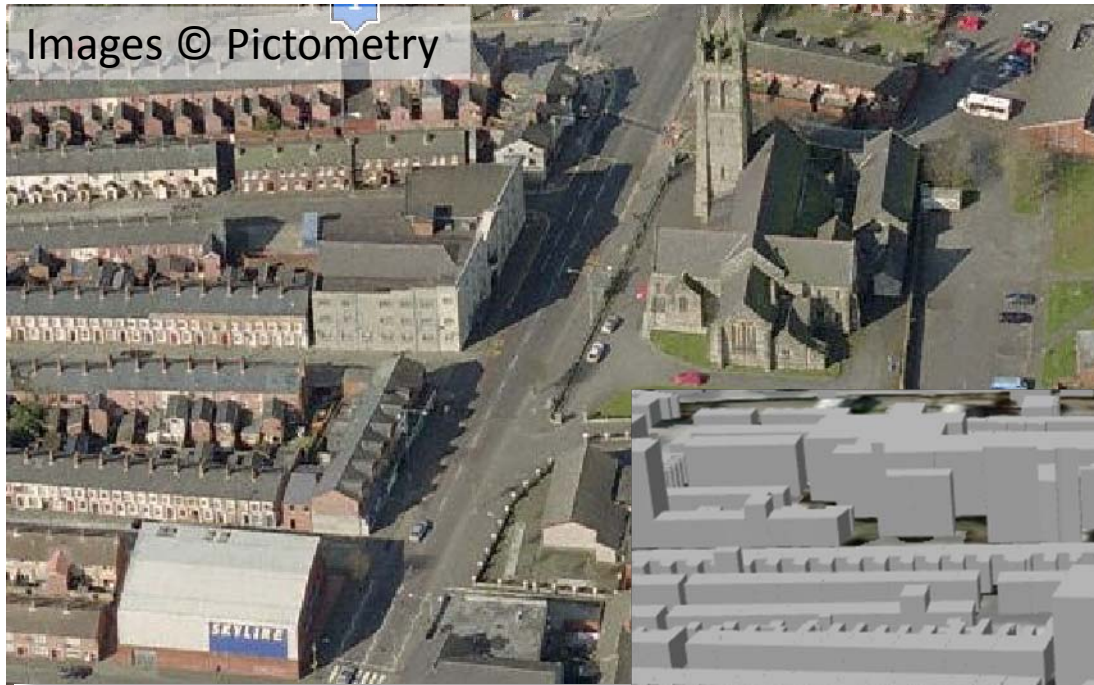
 [Windfarm, Geevagh, Sligo, Ireland...](#)

Other models you might like:

 [Stormont, Belfast, Ireland.](#)

**Model complexity** [What's this?](#)

# Simple Asset Development



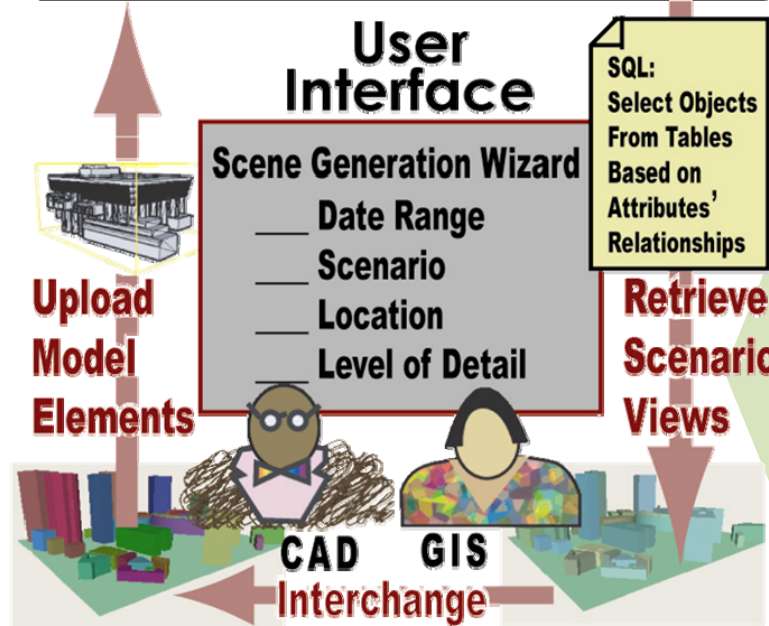
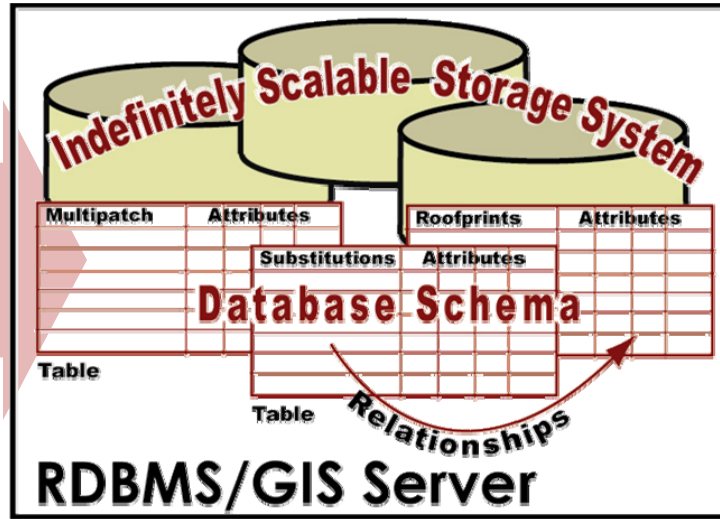
Models may be measured and articulated using oblique Photography.

- Massing Model: 1 Minute
- Church model: 1 hour
- Barn Model: 10 min

# Database Asset Management System

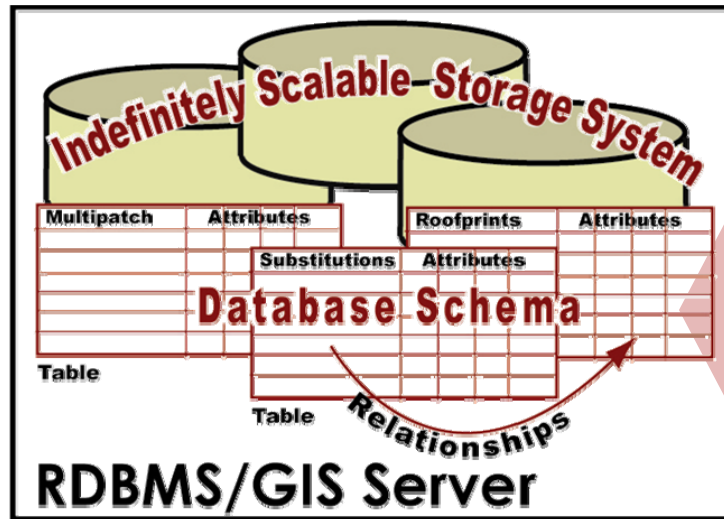
## Very Large Collection Of Model Elements:

- Massing Model
- Detailed Building Models
- Historic Conditions
- Proposed Future Conditions



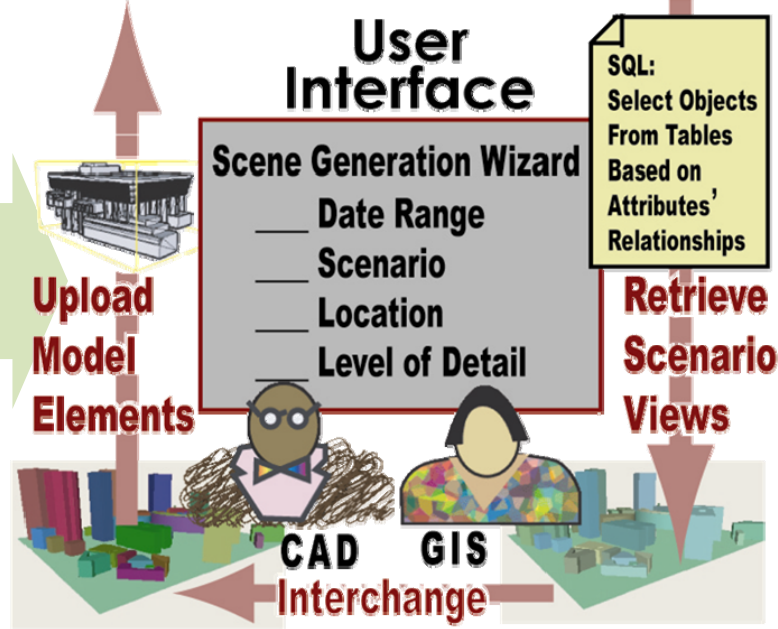
Versatility in Retrieving and Composing Scenes

# Technical Requirements



- Database Management Tools:**
- ArcGIS Desktop
  - ArcGIS Server
  - Open Source: Possible

- Authoring Tools:**
- Standards Compliant
  - Sketchup
  - 3D Studio
  - Other

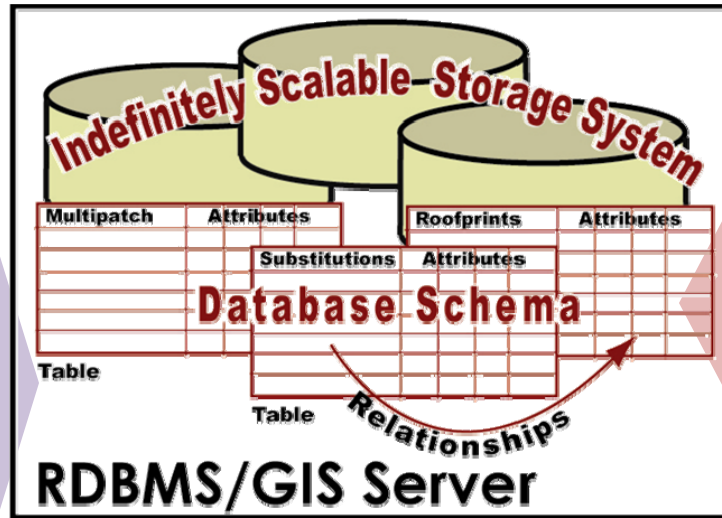


# Development Requirements:



## Database Design & Development:

- Conceptual Design
- Schema Design
- Data Prospecting
- Data Transformation
- Documentation



## Database Management Tools:

- ArcGIS Desktop
- ArcGIS Server
- Open Source: Possible

## Computing Environment

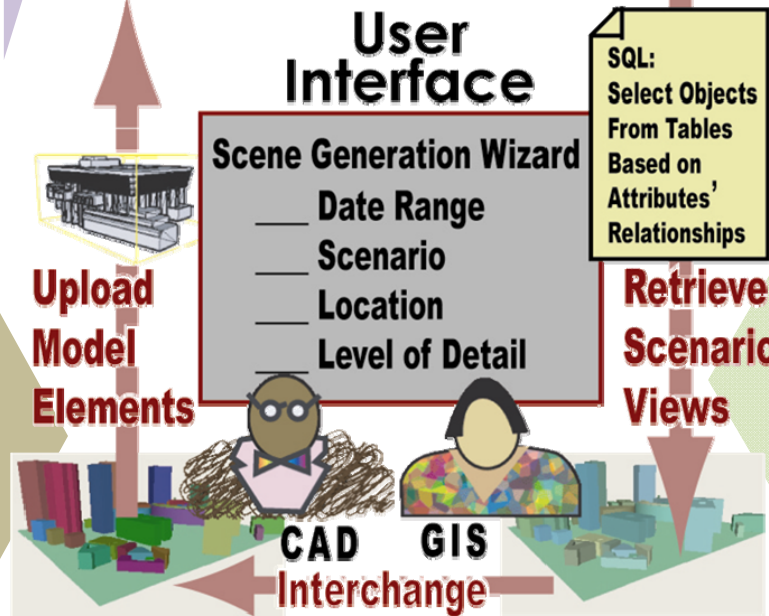
- Servers
- Backups

## GIS / CAD Specialist:

- Skilled / Tenacious
- Well Organized
- Successor - Oriented

## Training:

- Software Technique
- Asset Management Best Practices



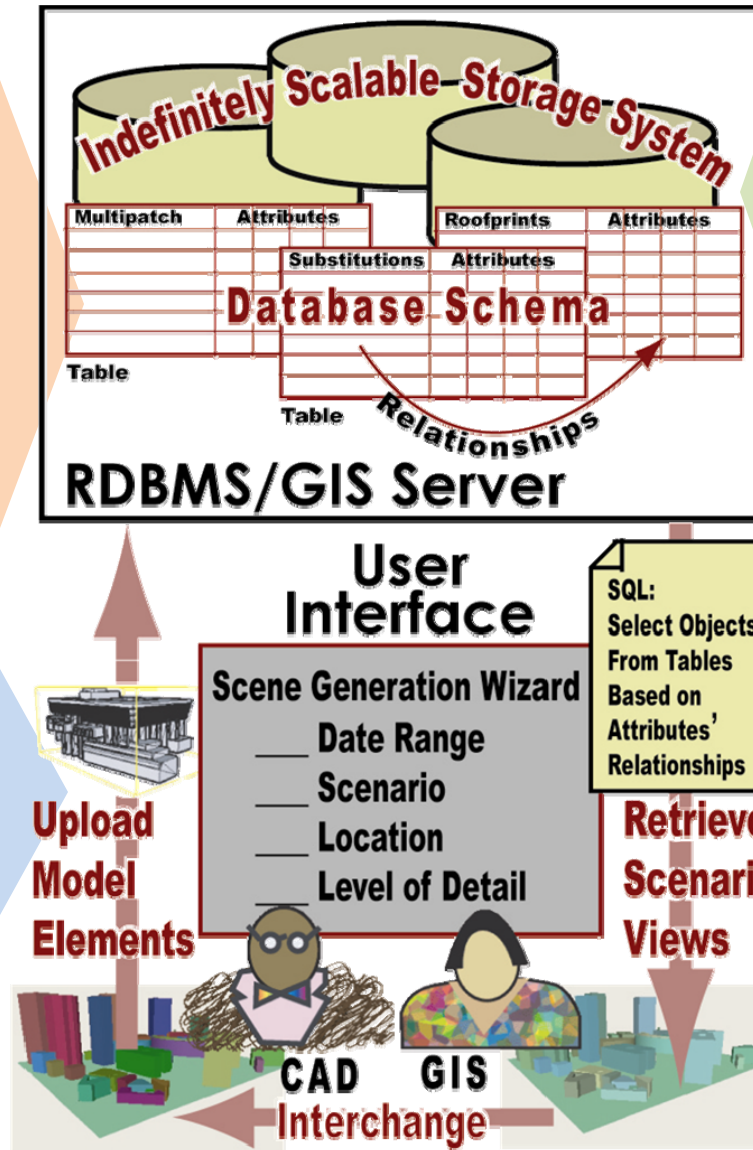
# Model Asset Lifecycle

## Government Collaborators:

- Aerial Photos
- Terrain Model
- Buildings (Heights?)
- Edge of Pavement
- Parks
- Water Bodies
- Trees
- Property Parcels

## Model Contributors:

- Design Community
- Citizen Participants
- Students
- Model Managers



## Documentation & Quality Control:

- Institutional Knowledge Repository

## Web Viewer Tools

- Google Earth
- ArcExplorer

## Composed Presentations:

- Acrobat
- Animation Files
- PowerPoint
- KML / Google-Earth



# Spatial Extension of the Model

Extending the model to cover new areas requires:

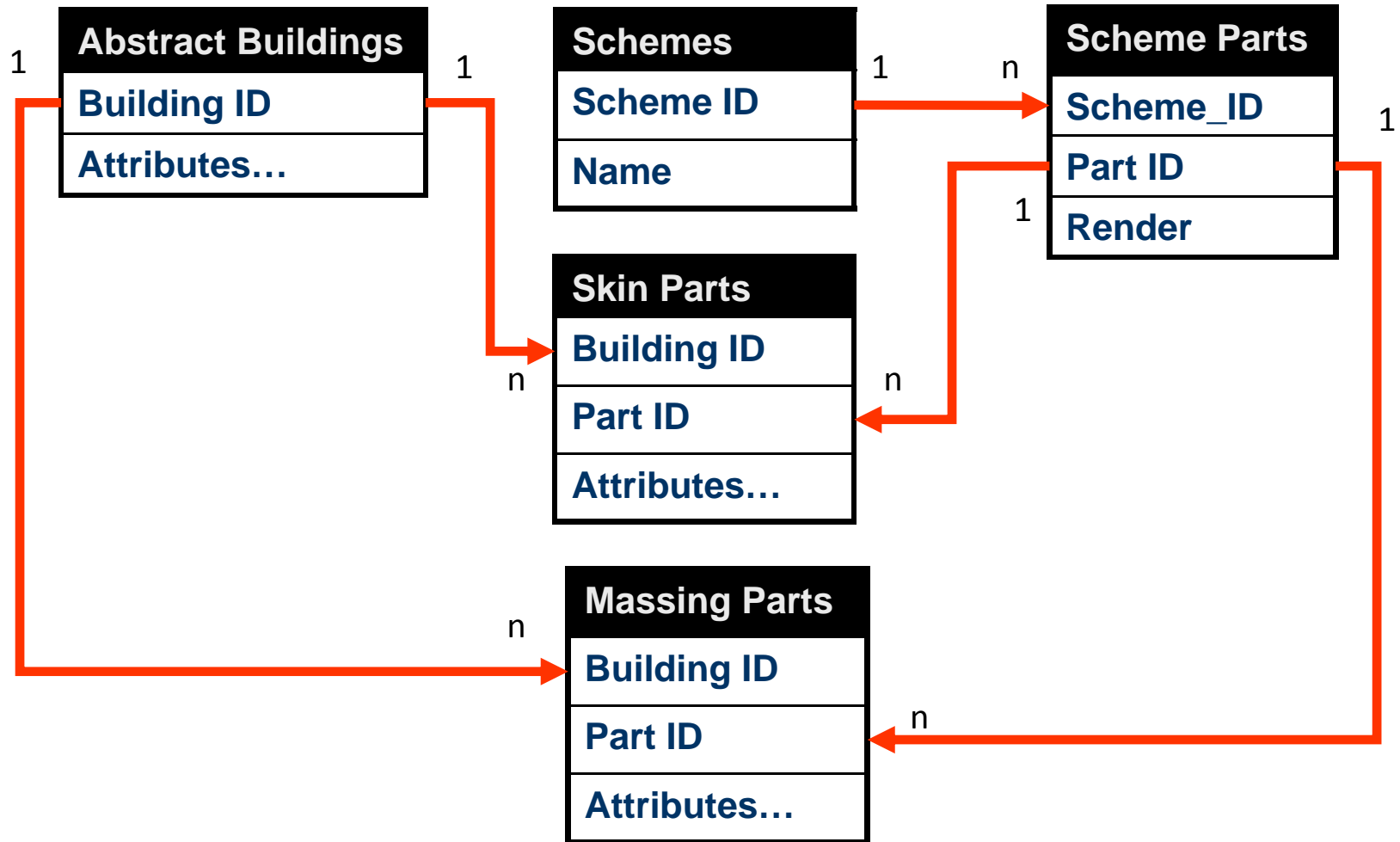
- Extended terrain model
- Extended aerial photo
- Extended building footprints
- Manual assignment of heights to footprints

Concern about data licensing...

# Semantic Extension of The Model

- The following slides describe a semantically enriched model designed based on the information maintained by the Town of Brookline, Massachusetts.
- Developing a repository of building models intended for long-term management and integration into local design review processes requires collaboration with local authorities and integration with cadastral information management.

# Building Model Management Schema



# 3d Building Massing Parts Table

The Massing Parts Layer forms a complete model of every building in the metro area at a low level of detail (CityGML LOD2). **Building parts may have more specific attributes from their parent Abstract Buildings.**

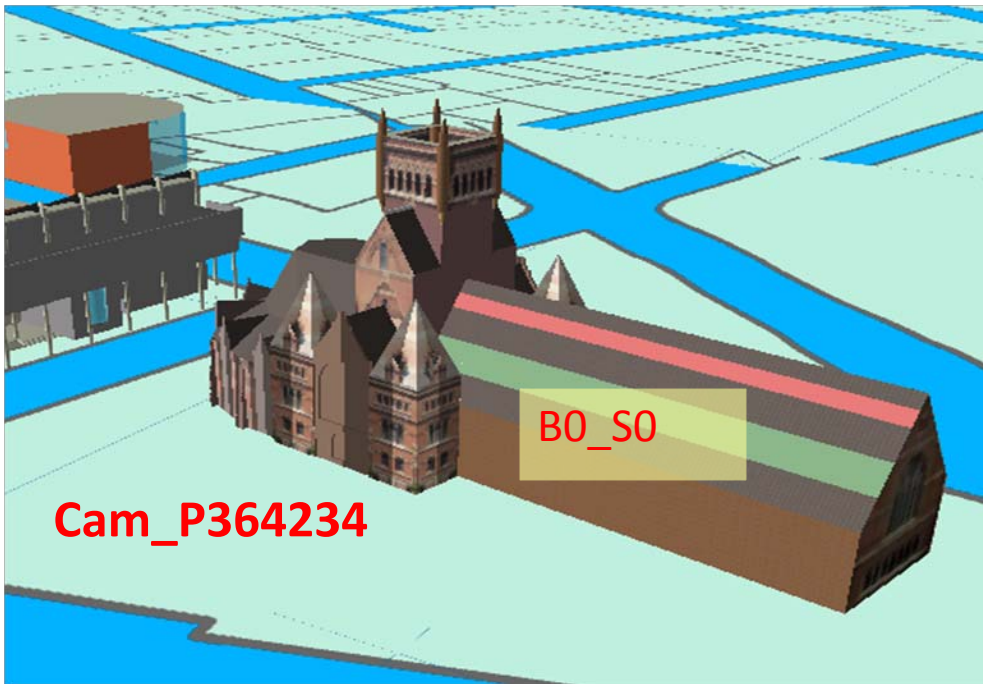


**Building Massing Parts**

<b>Part_ID</b>	<b>Cam_P364234_BO_M1</b>
<b>Owner</b>	<b>Null</b>
<b>Built Date</b>	<b>1998</b>
<b>Demo Date</b>	<b>Null</b>
<b>Address</b>	<b>Null</b>
<b>Built</b>	<b>Yes</b>
<b>Stories</b>	<b>2</b>

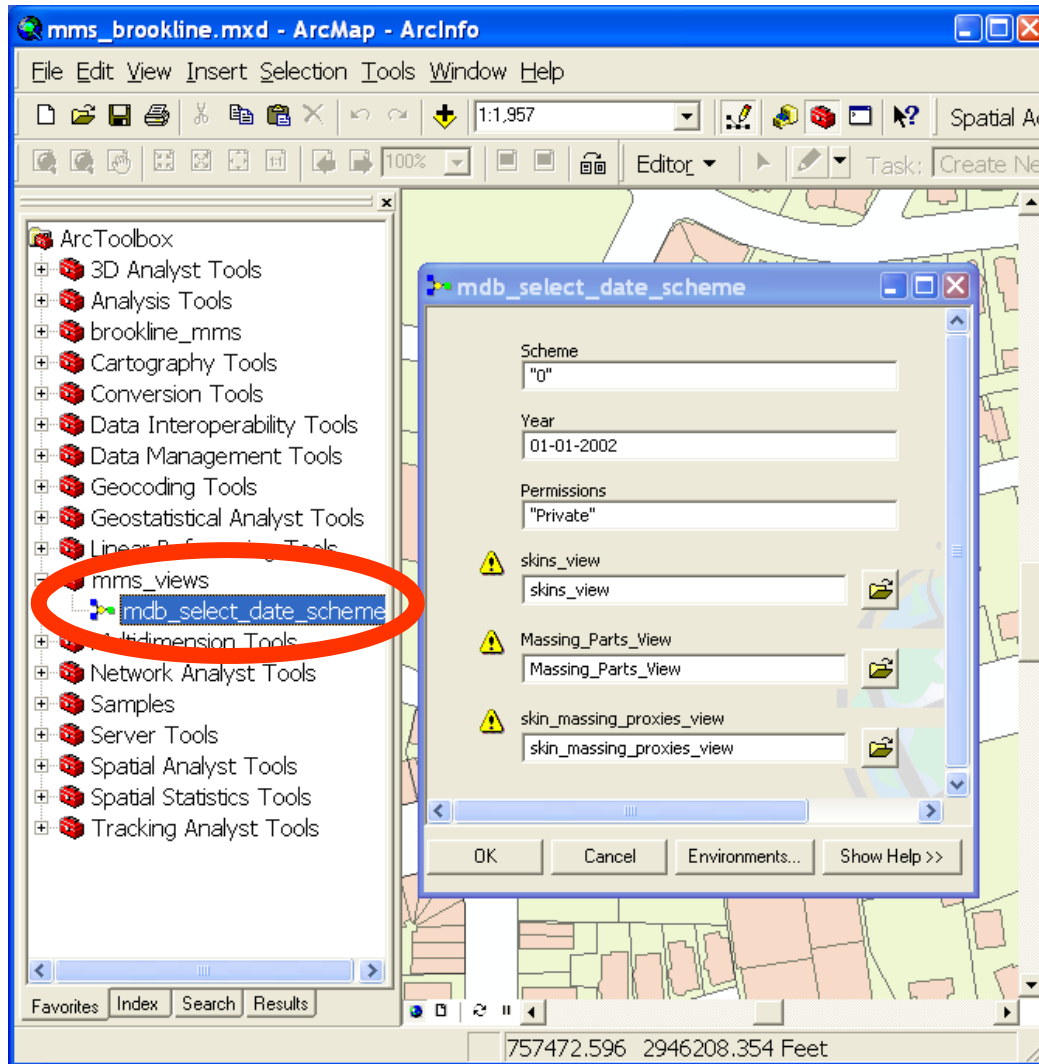
# 3d Building Skin Models

Using a 3D authoring tool, models of building exterior skins can be encapsulated as sketchup or collada models and placed into relational tables as georeferenced objects. Like Massing Parts, Skin Parts have unique IDs linking them to abstract buildings and may have more specific attributes.



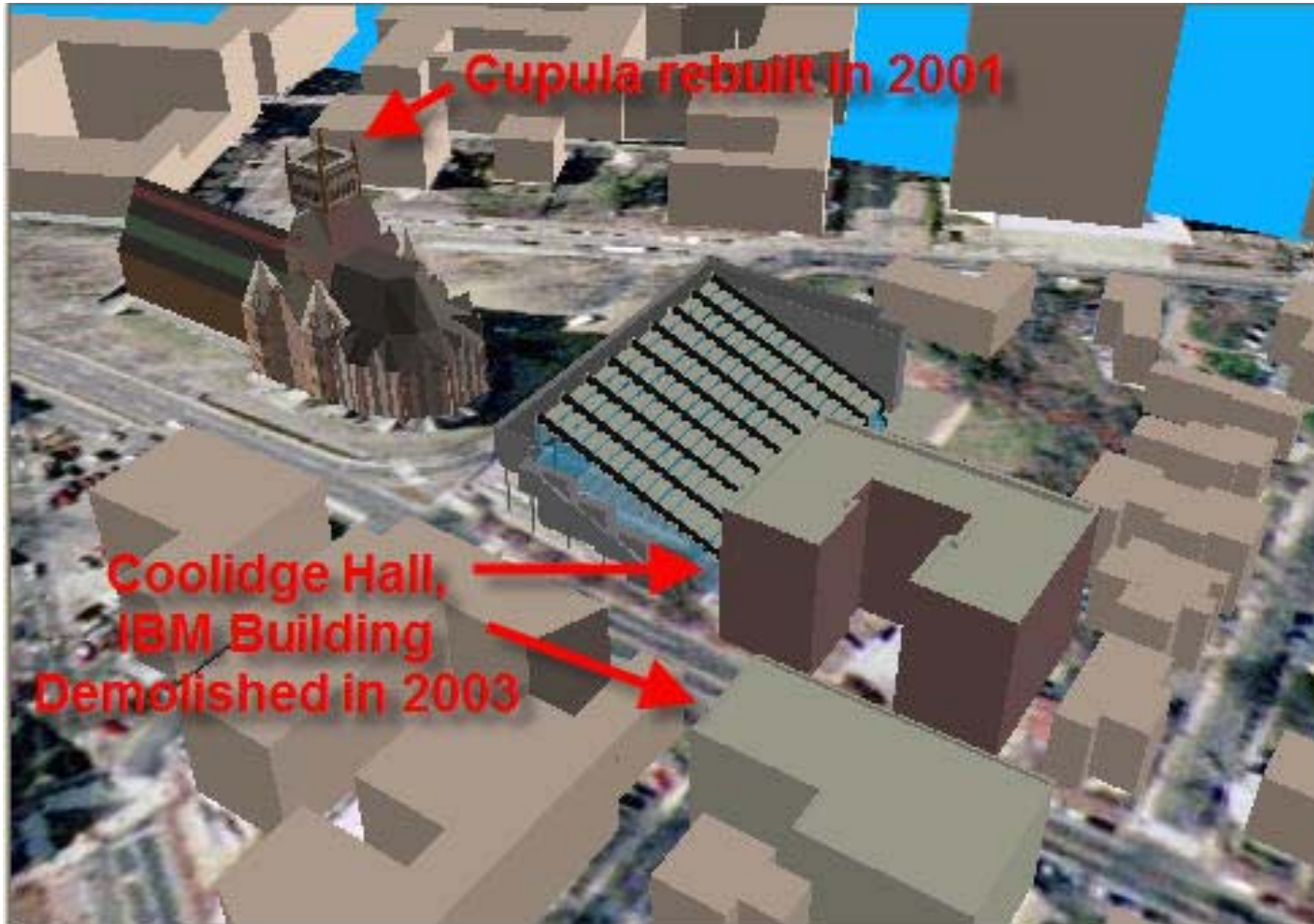
Building Skin Parts	
Shape	<b>Multipatch</b>
Model	<b>Sketchup or Collada Blob</b>
Part_ID	<b>Cam_P364234_B0_S0</b>
Owner	Null
Build Date	<b>1870</b>
Demo Date	Null
Built	Yes

# The Scheme View Tool

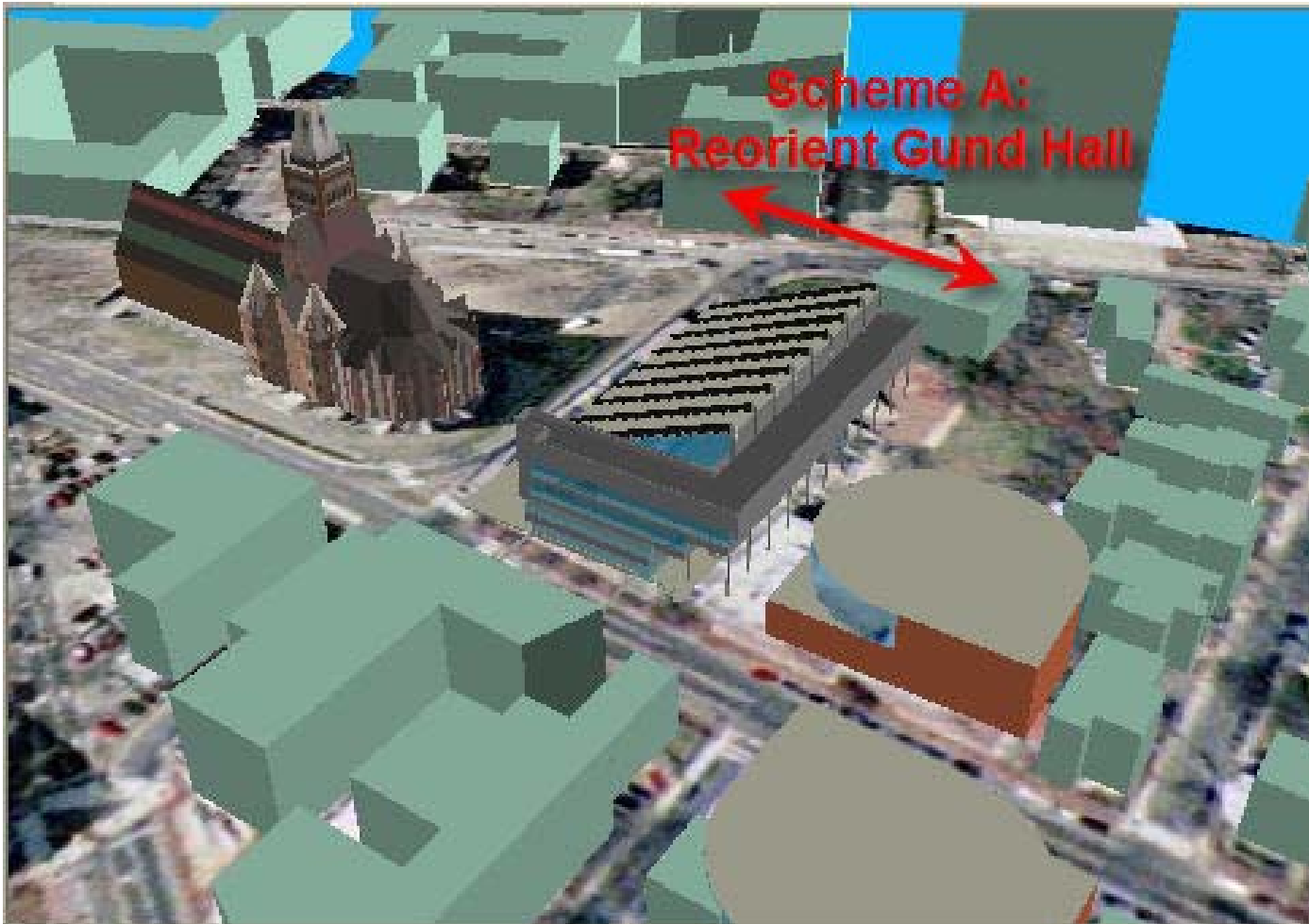


A tool has been created with all of the SQL to create the three views necessary to portray a Date and Scheme Specific Scenario based on the user's privileges. One needs only to double-click on the tool and fill in the blanks.

# 1998 Historic View

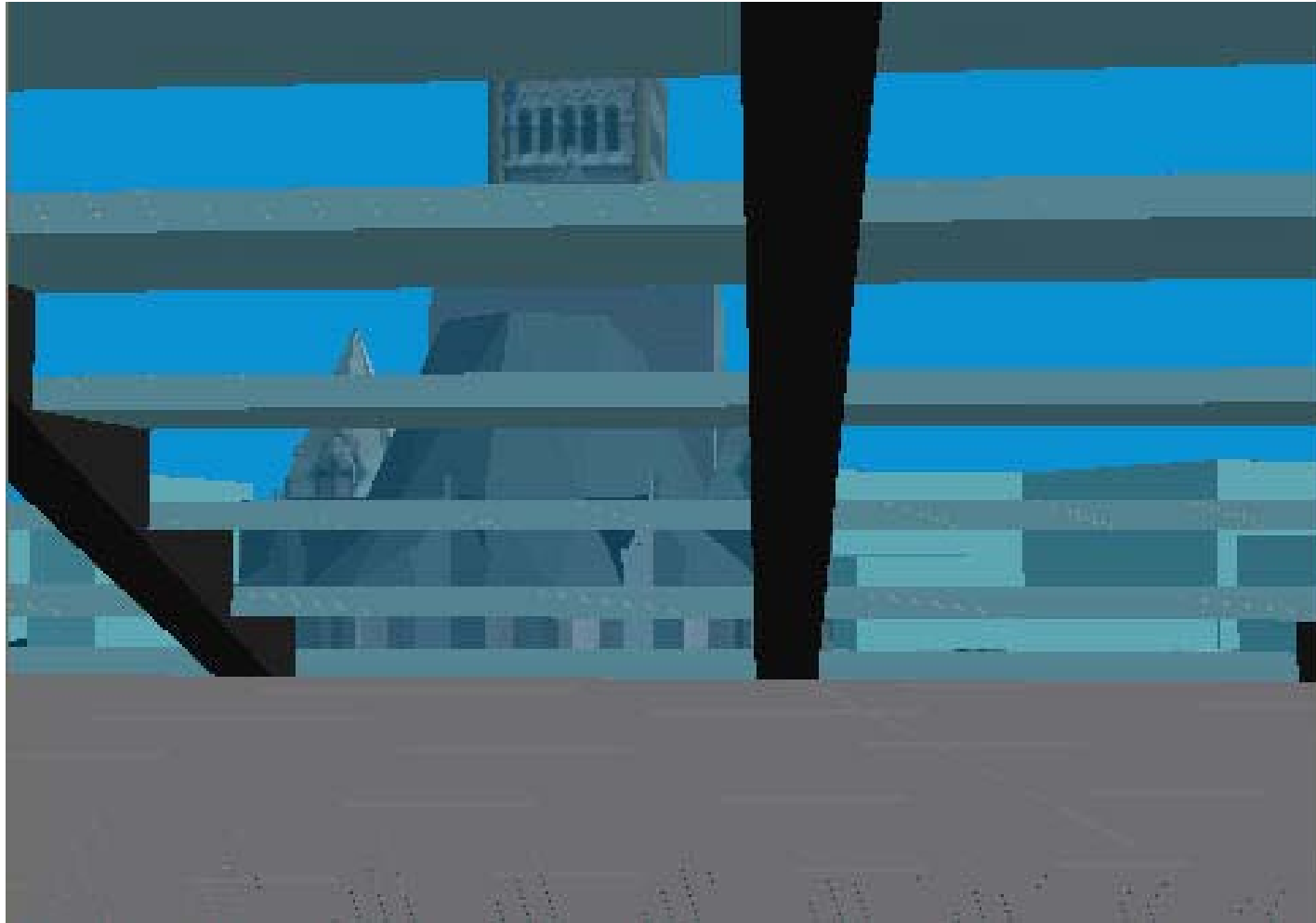


# Unbuilt Scheme: Turn Gund Hall Around





# View From Proposed Design Scheme



# References

- [Harvard GSD Metromodel Management System](#)
- [Public Infrastructure for Virtual Cities](#)
- [Virtual City Collective](#)
- [Town of Brookline Model Management System](#)
- [City Geography Markup Language](#)
- [Collada: 3D Asset Exchange Schema](#)
- [Integration of CAD, GIS, and Building Information Models in Open Web Services](#)
- [Building Interior Spaces Data Model for GIS](#)
- [Studying Urban View Corridors](#)
- [Belfast 3d Model Phase 1](#)