Urban Design Laboratory

City of Belfast, United Kingdom

Richard Sommer   **Paul Cote**

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Outline of Presentation

- Source Data and Organization
- Application: An Urban Design Investigation
- Presentation / Visualization Alternatives
- Necessity of a Database Foundation
- Strategies for Developing the Model
- Analytic Applications of Urban Data
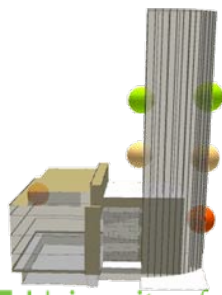
Belfast Model: Information Sources

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)

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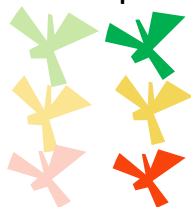# Obel Tower View Studies

View of Tower:

(Above)   Partial | Full

51 Meters

34 Meters

17 Meters

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:
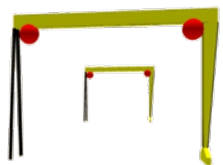**Albert Clock by Inshore Surveys.com; Obel Tower by PeterRam**

View Corridors

Crane Points Number visible:

All 2

3 1

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!
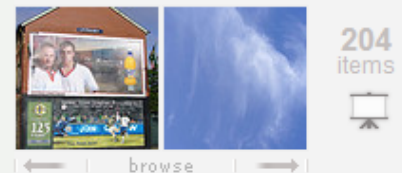
Shadow Studies
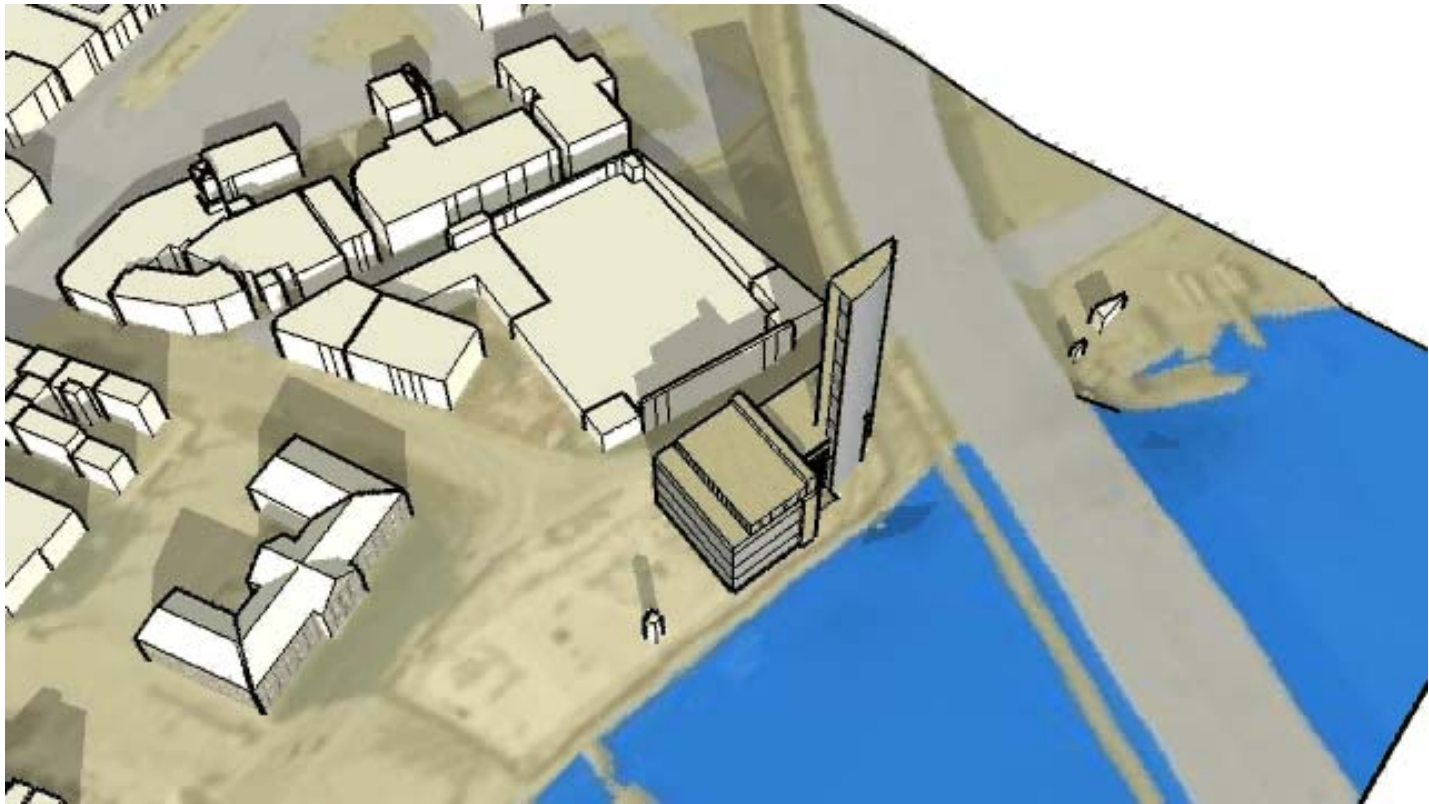
Obel Tower Shadows 9:00 AM to 5 PM March 25th
(Google Sketchup)

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Obel Tower Model by PeterRam shared on Google3d Warehouse

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Community Sharing of 3d Model Assets

Standards for data exchange:

Collada, IFC, X3D

Simple Asset Development

Images © Pictometry
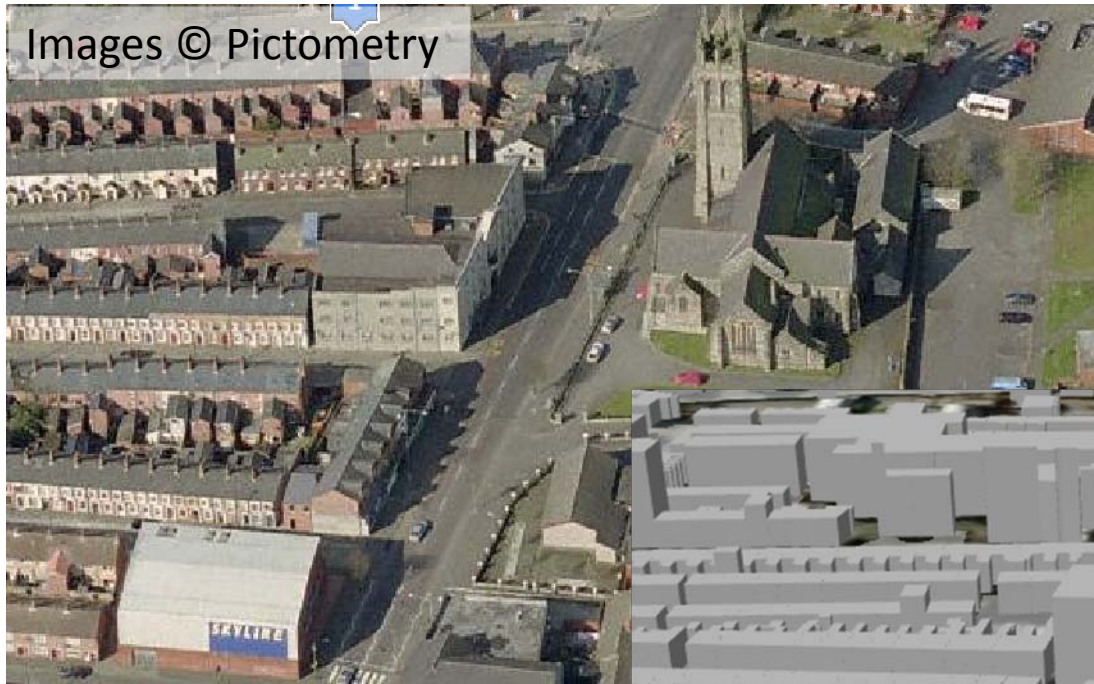
Models may be measured and articulated using oblique Photography.

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

Democratization of Urban Design Tools

– Community participation
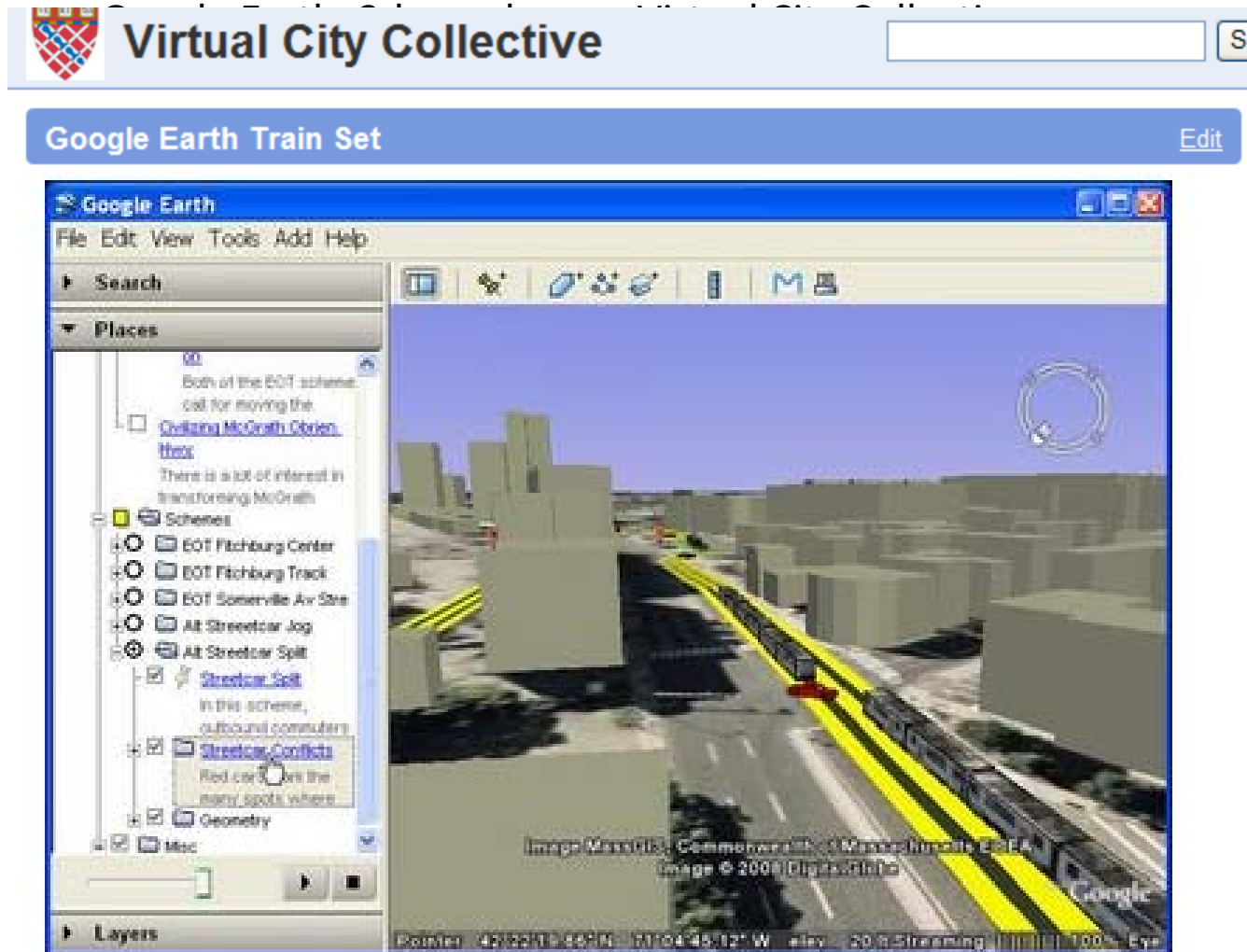
Google Model Your Campus Initiative
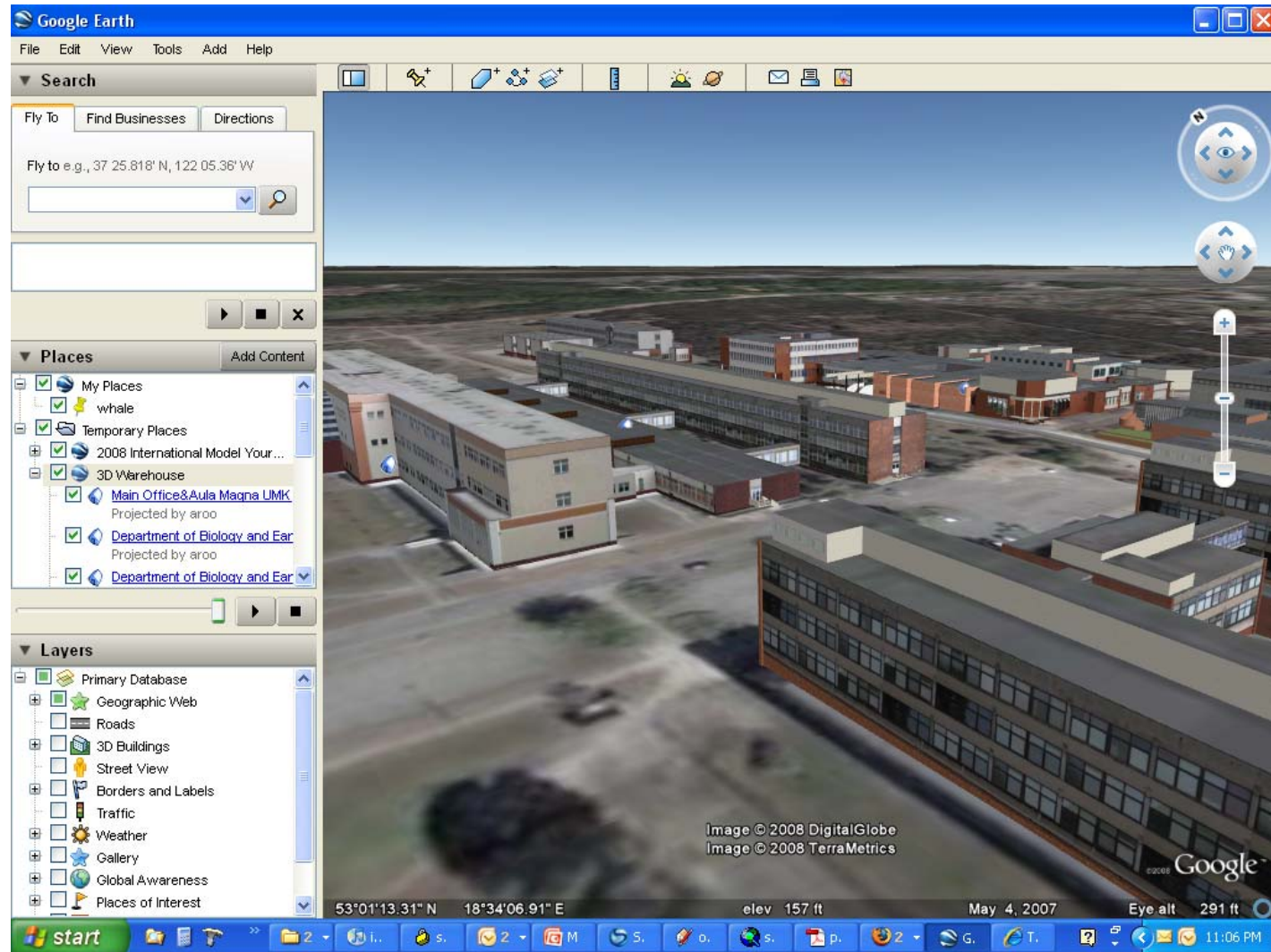
Nicholas Copernicus University,
Winning Entry: Google Model Your Campus Competition

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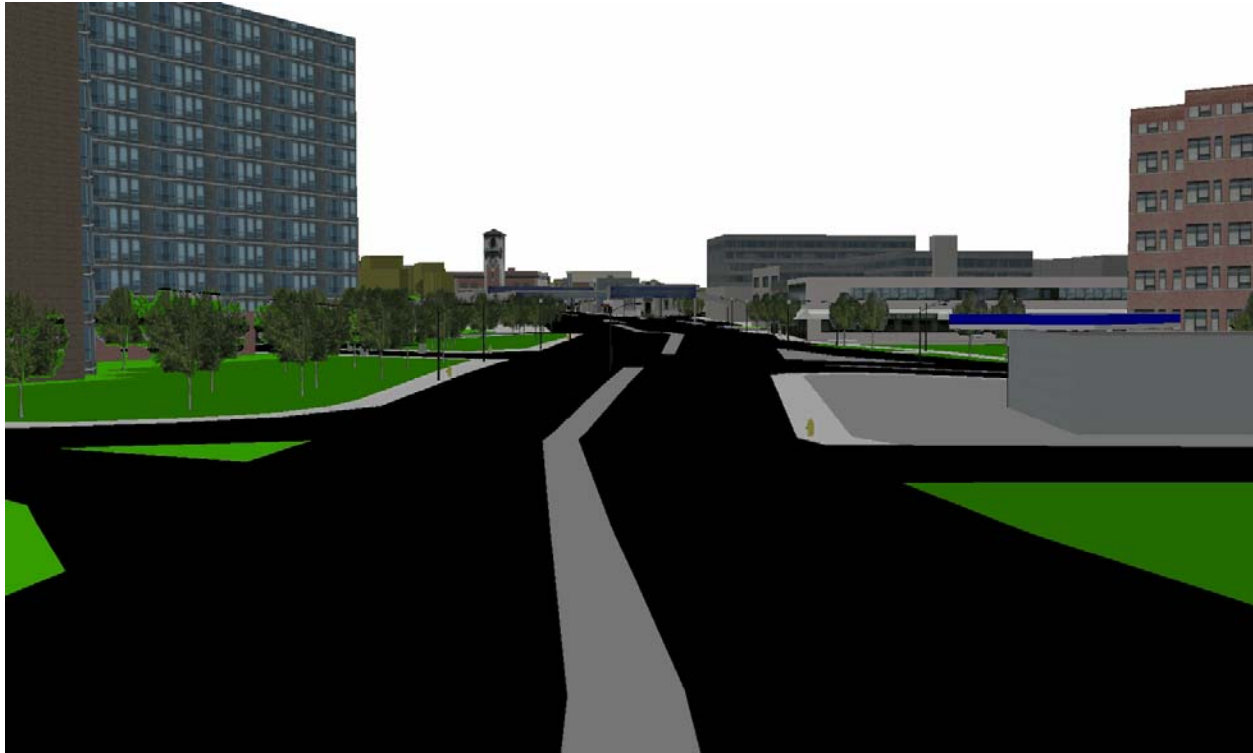
Better planimetric layers for ground cover, pavement, trees and street furniture may yield more evocative diagrammatic Portrayals. It would be possible to create more photorealistic Studies than this one using data from the GIS repository.

Database Asset Management System

Very Large Collection Of Model Elements:
- Massing Model
- Detailed Building Models
- Historic Conditions
- Proposed Future Conditions

Indefinitely Scalable Storage System

| Multipatch | Attributes | | Roofprints | Attributes |

Substitutions   Attributes

Database Schema

Table

Table   **Relationships**

RDBMS/GIS Server

User Interface

Scene Generation Wizard
___ Date Range
___ Scenario
___ Location
___ Level of Detail

SQL:
Select Objects From Tables Based on Attributes' Relationships

Upload Model Elements

Retrieve Scenario Views

Versatility in Retrieving and Composing Scenes

CAD   GIS Interchange

Building Model Management Schema

Abstract Buildings
- Building ID
- Attributes…

1 ... 1

Schemes
- Scheme ID
- Name

1 ... n

Scheme Parts
- Scheme_ID
- Part ID
- Render

1

1

Skin Parts
- Building ID
- Part ID
- Attributes…

n

n

Massing Parts
- Building ID
- Part ID
- Attributes…

n

n

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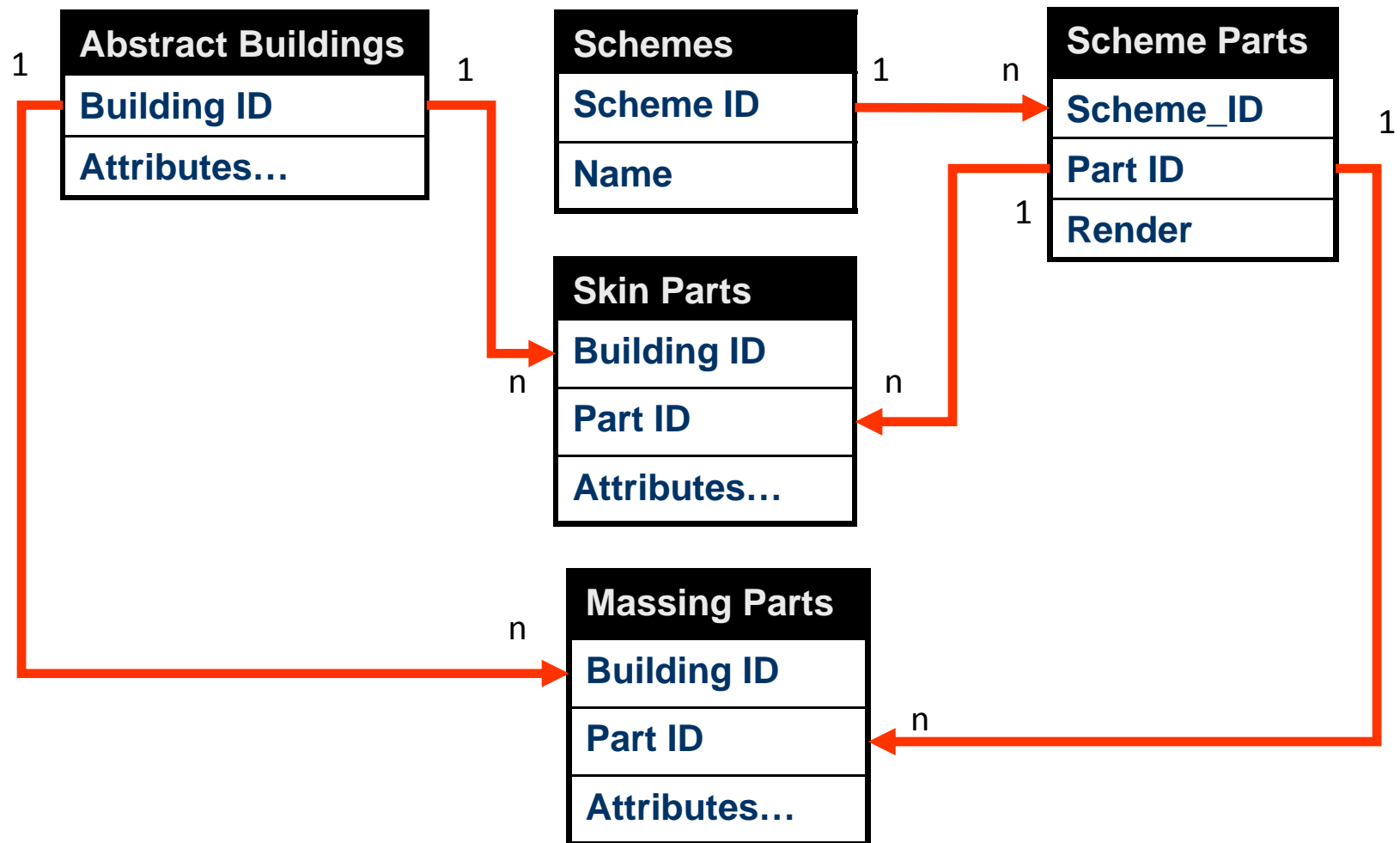
3d Building Massing Parts Table

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	
Part_ID	Cam_P364234_B0_M1
Owner	Null
Built Date	1998
Demo Date	Null
Address	Null
Built	Yes
Stories	2

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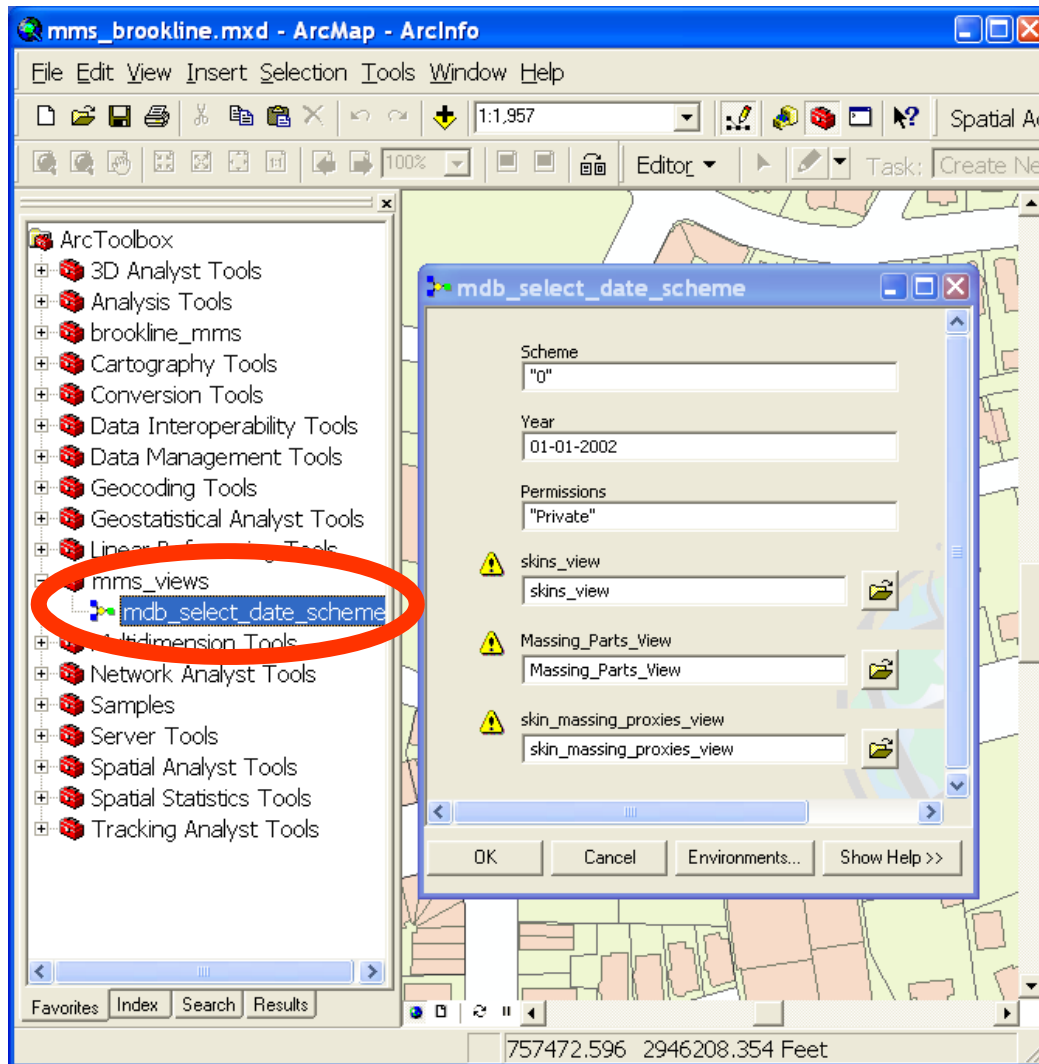
3d Building Skin Models

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.
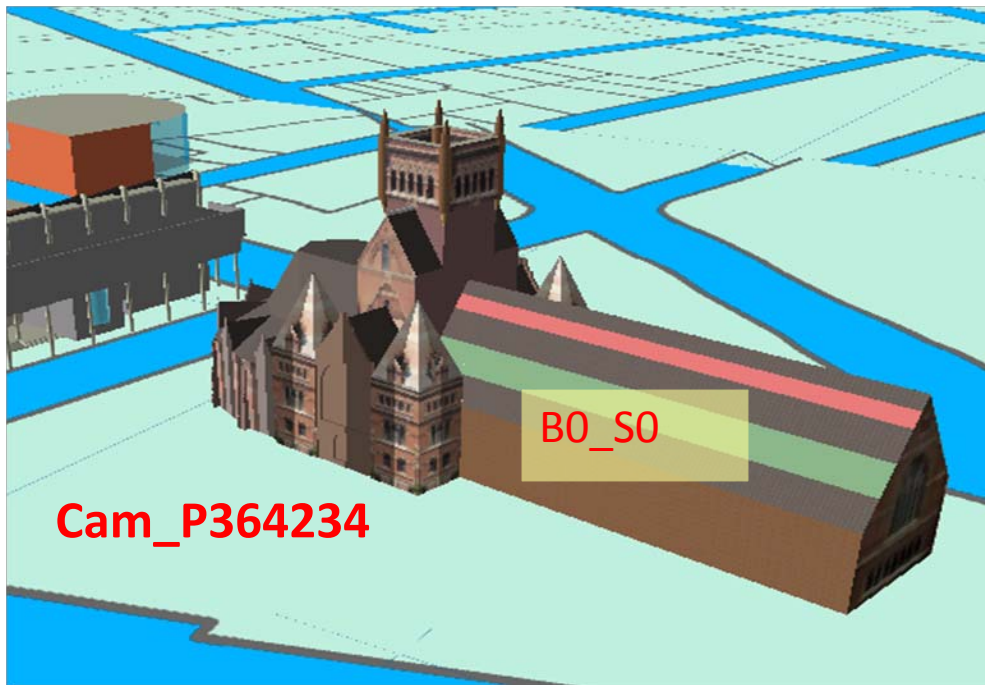
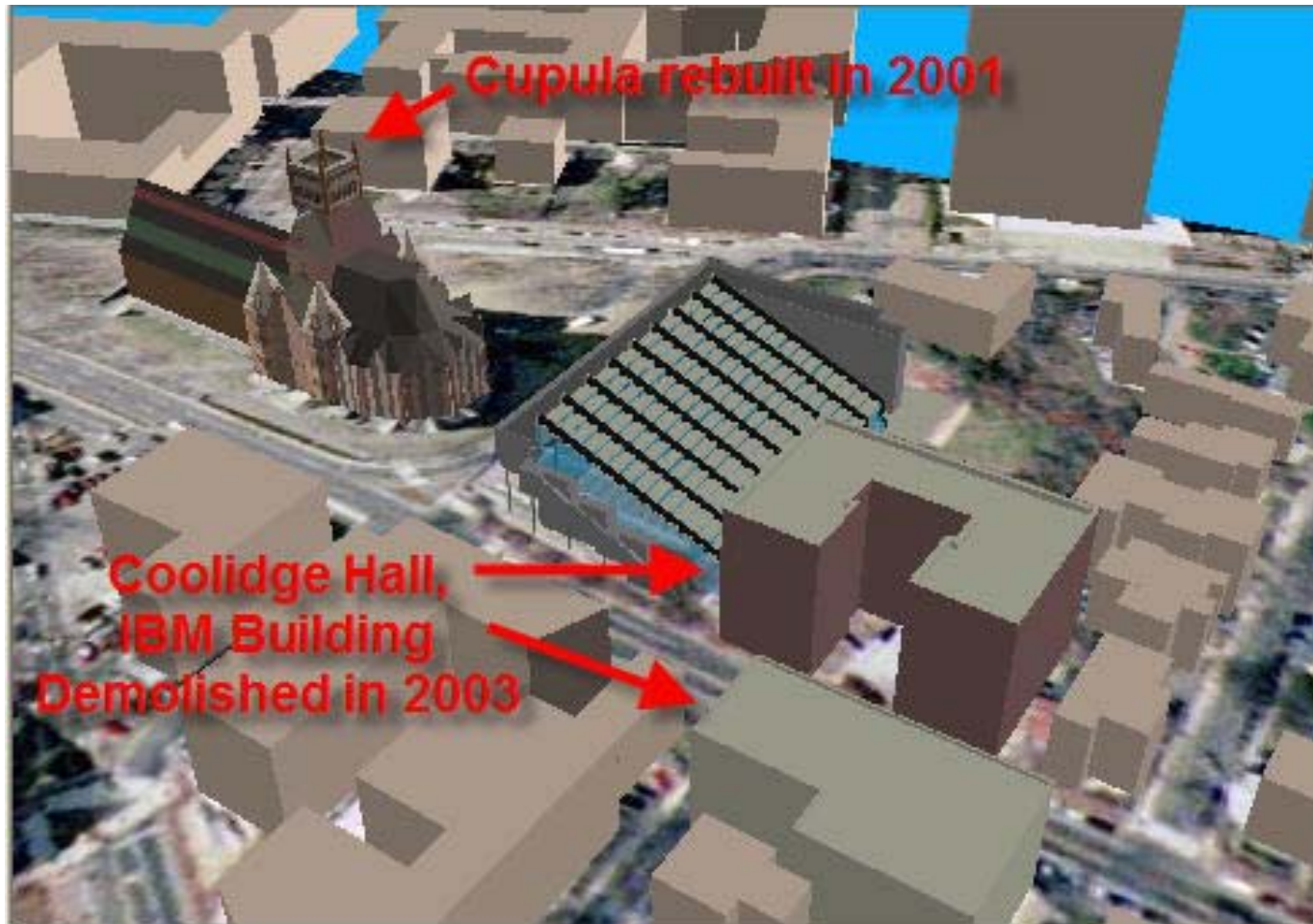| Building Skin Parts	
Shape	Multipatch
Model	Sketchup or Collada Blob
Part_ID	Cam_P364234_B0_S0
Owner	Null
Build Date	1870
Demo Date	Null
Built	Yes

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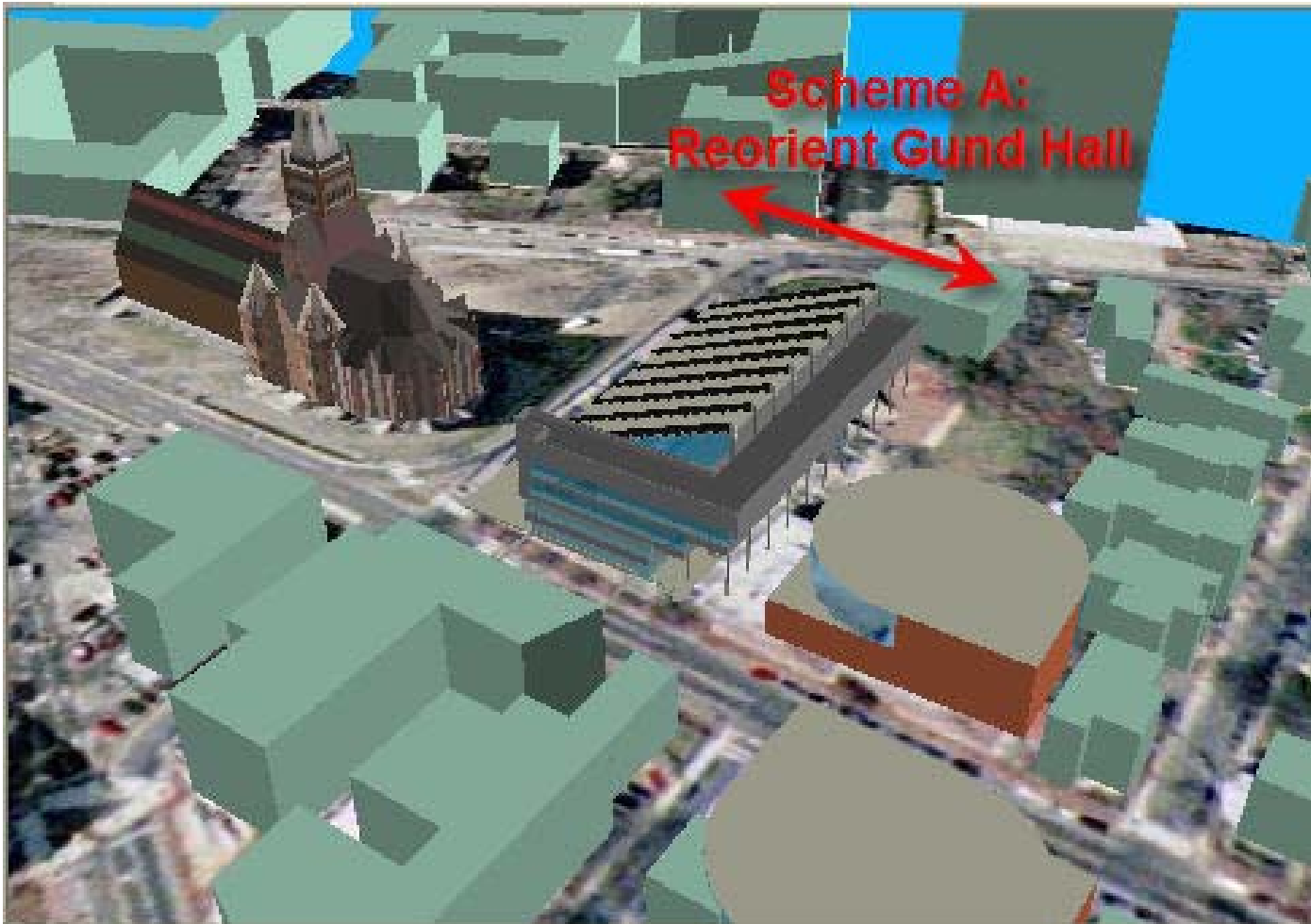www.planetable.us

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.

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1998 Historic View

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Unbuilt Scheme: Turn Gund Hall Around

Scheme A:
Reorient Gund Hall

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View From Proposed Design Scheme

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Technical Requirements
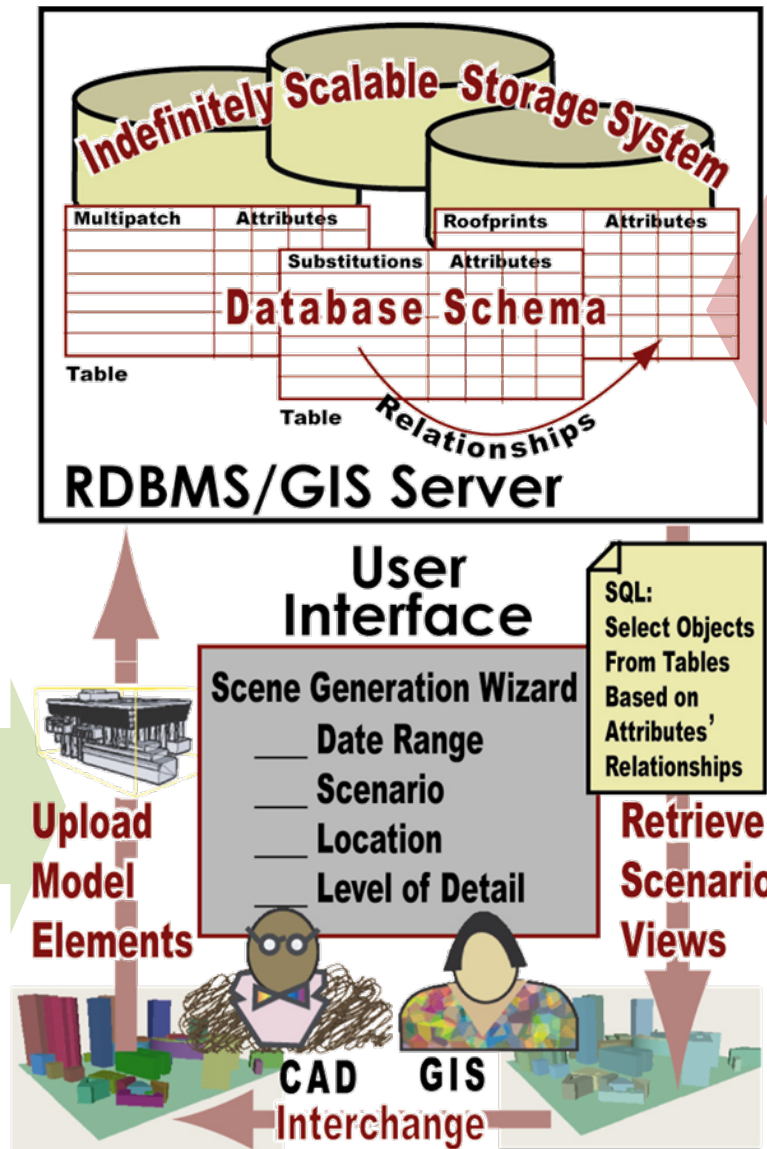
Authoring Tools:
- Standards Compliant
- Sketchup
- 3D Studio
- Other

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

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Development Requirements:

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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

Training:
- Software Technique
- Asset Management Best Practices
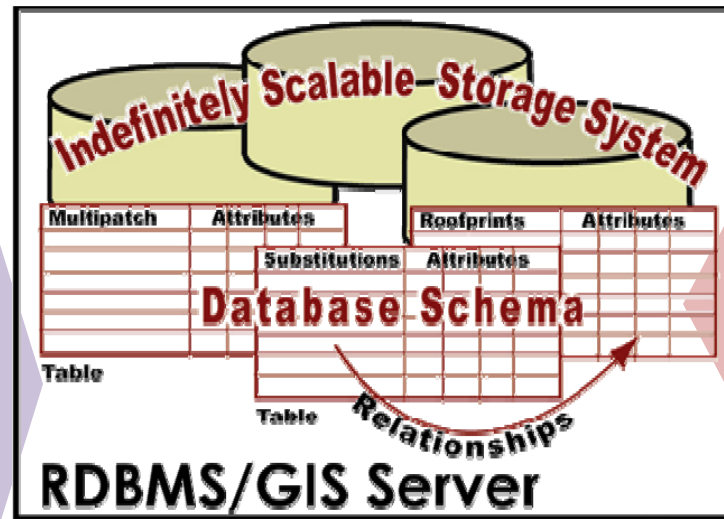
GIS / CAD Specialist:
- Skilled / Tenacious
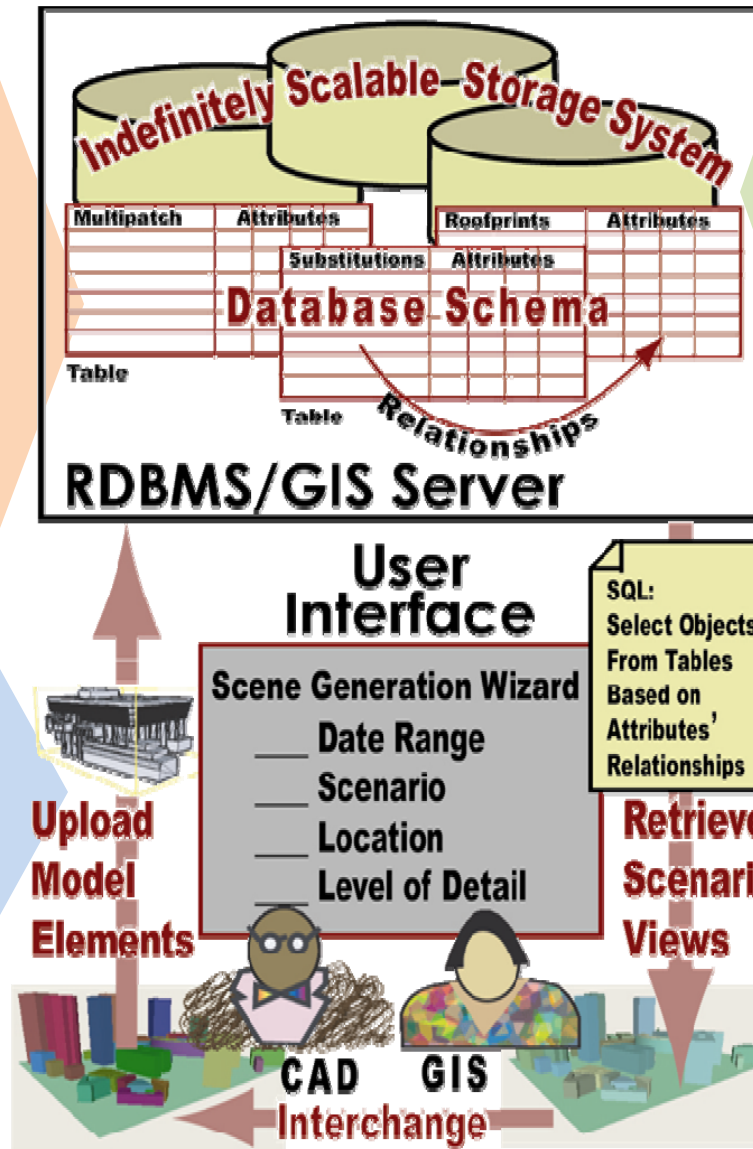- Well Organized
- Successor - Oriented

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 Patricipants
- Students
- Model Managers

Indefinitely Scalable Storage System

Multipatch | Attributes | Roofprints | Attributes
Substitutions | Attributes
Database Schema
Table | Table | Relationships

RDBMS/GIS Server

User Interface

Scene Generation Wizard
___ Date Range
___ Scenario
___ Location
___ Level of Detail

SQL: Select Objects From Tables Based on Attributes' Relationships

Upload Model Elements

Retrieve Scenario Views

CAD GIS Interchange

Documentation & Quality Control:
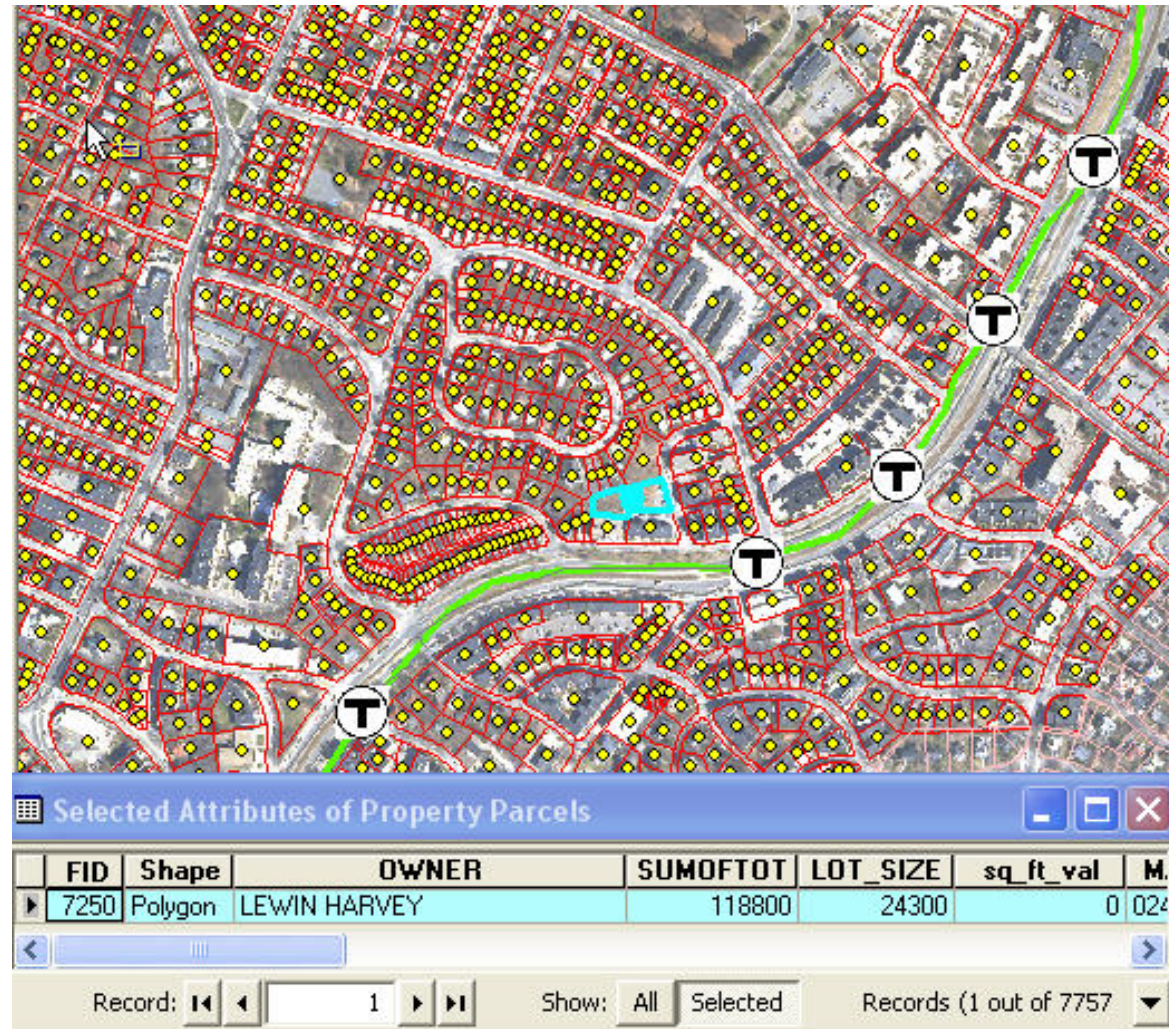- Institutional Knowledge Repository

Web Viewer Tools
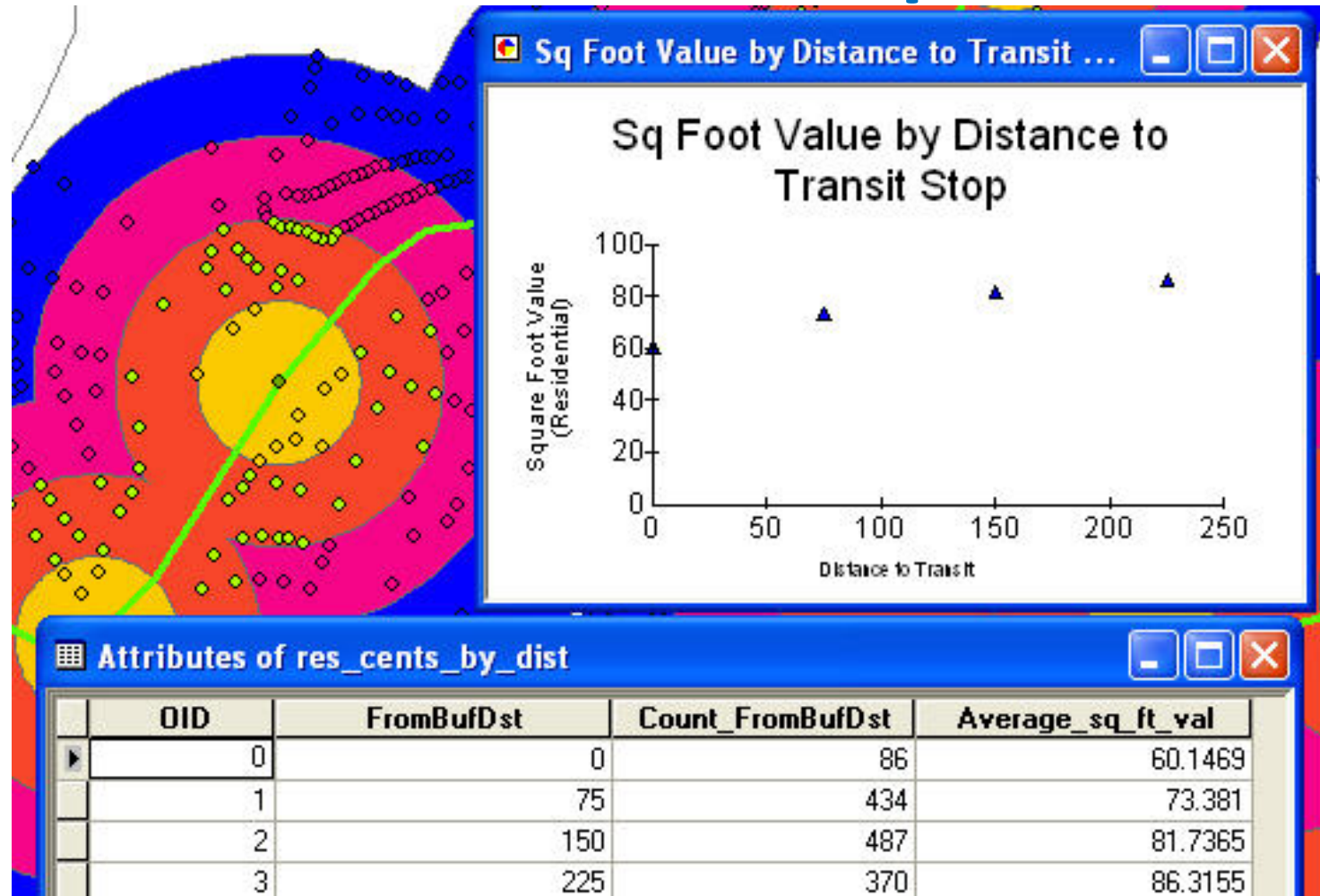- Google Earth
- ArcExplorer

Composed Presentations:
- Acrobat
- Animation Files
- PowerPoint
- KML / Google-Earth

Analysis of Development Potential: Value of Transit Stop Access

Analysis of Development Potential: Value of Transit Stop Access

Analysis of Development Potential: Value of Transit Stop Access

Within 50 Meters

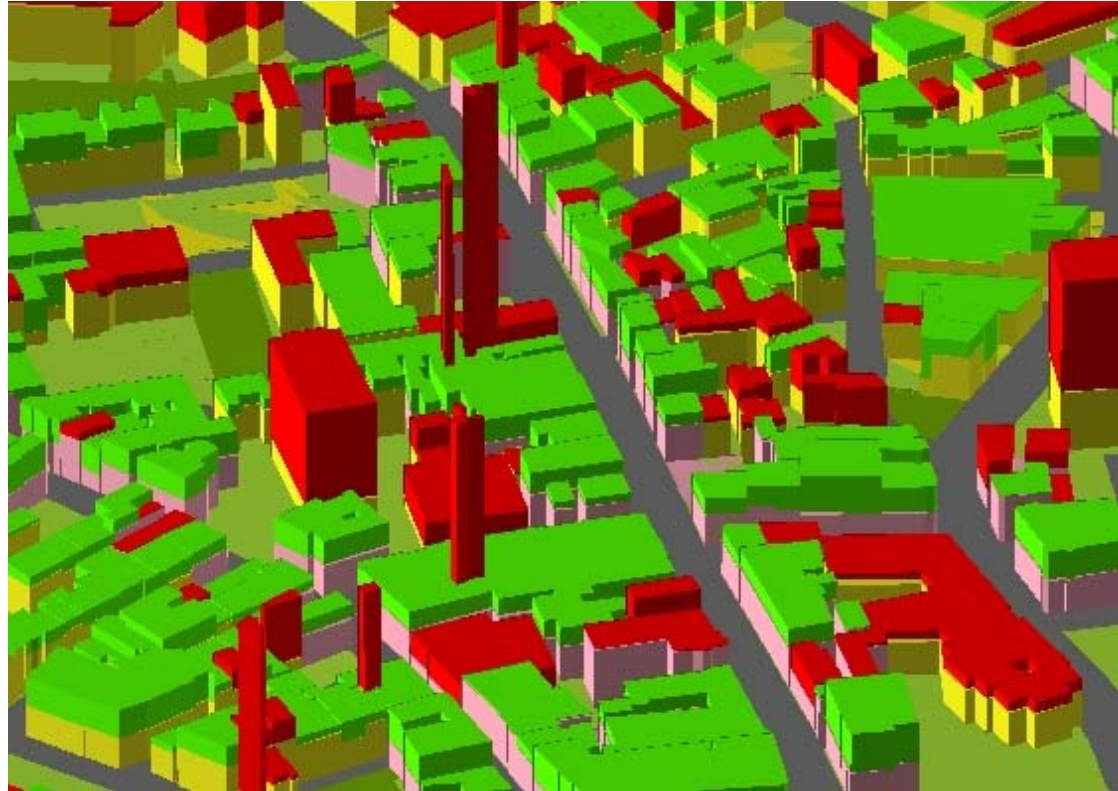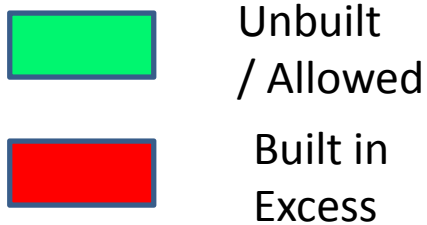University of **ULSTER**

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Analysis of Development Potential: Value of Transit Stop Access

Within 250 Meters

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Analysis of Development Potential: Permitted vs Built Density

Land Use

Commercial

Residential

Density Potential

Unbuilt / Allowed

Built in Excess

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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](#)