Your Perfect 3D World (BIM and GIS Integrated)

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Project Objectives

- Standardize Data
  - One Source ♦ BIM Data
- Share Data in a Friendly and Accessible way
- Support the Decision Making Process
Buckeye BIM Initiative

Medical Center
- complete
Main Campus
- In Progress

Converted
- 15,525,022 sq ft

Total
- 34,350,000 sq ft
BIM Benefits for Design and Construction

- Improved design process
- 3-D visualization for owner (static only)
- Coordination between disciplines
- Interference checking
- Facilitates energy efficiency and LEED
- Automated quantity take offs
- 4-D scheduling
- Improved documentation of design intent
- Potentially used for fabrication
• Conceptual Model (LOD1)
  • Spaces, Volumes, approximate shapes
• Approximate Geometry (LOD2)
  • Generic elements, materials
  • Specific rooms/spaces
• Precise Geometry (LOD3)
  • Specific elements detailed
  • Interference checking
  • Suitable for Construction Documents
• Fabrication (LOD4)
  • Contractor/fabricator details
• As-Built
BIM to GIS Integration Issues

- BIM is MUCH richer in detail than GIS
- GIS has only recently become fully 3-D
- Design BIM contains all the information needed to construct a building, but not to manage it
  - Space polygons
  - Occupant information
  - Asset details (make, model, etc.)
  - Equipment maintenance data
- Missing tabular data can be supplied by Construction Operations Building Information Exchange (COBie)
IFC can be used to exchange and share BIM data between applications developed by different software vendors without the software having to support numerous native formats.

As an open format, IFC does not belong to a single software vendor; it is neutral and independent of a particular vendor’s plans for software development.
Standards

• The IFC specification is written using the EXPRESS data definition language, defined as ISO10303-11 by the ISO TC184/SC4 committee.
  • It has the advantage of being compact and well suited to include data validation rules within the data specification.
  • It is an ASCII file format used to exchange IFC between different applications.
Elements in BIM are Created in Detail

This data is required to convey the information needed to construct the facility.
## 3D Formats

<table>
<thead>
<tr>
<th>Format</th>
<th>Benefits</th>
<th>Limitations</th>
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</table>
| COLLADA                 | • Support advanced material handling, asset instancing, and multiple UV sets.  
                          • Static Model Import  
                          • Shape Import  
                          • Open to several software packages | • Machine resource heavy  
                          • Light size file |
| CityGML                 | • OGC compliance  
                          • Not Software driven  
                          • Scalable modeling (Exterior and interior)  
                          • Indoor Modeling (routing) | • Not a straightforward import  
                          • Light size file |
| 3DS                     |                                                                          | • Old format (not very efficient) |
| OBJ                     | • Static Model Import  
                          • Shape Import | • No indoor Modeling (routing)  
                          • No texture |
| KML                     | • Static Model Import  
                          • Shape Import | • No indoor Modeling (routing) |
| Shape/Goedatabase®      | • Static Model Import  
                          • Shape Import  
                          • "Native to the Software" | • No indoor Modeling (routing)  
                          • No texture |
| Autodesk® FBX®          | • support advanced material handling, asset instancing, and multiple UV sets | • Some minimal indoor modeling,  
                          • Machine resource heavy  
                          • Movie driven  
                          • Not supported by FME |
| OSM                     | • Free source of data for the base data (2D only) | • Not a 3D dataset |
Data Conversion Workflow

- Revit → FME → ArcGIS

- 2D Desktop Web App
- 3D CityEngine Arc Scene
Coordinates and Elevation from ArcMap

Enter Coordinates in Revit
FME Conversion

SAFE SOFTWARE

WOOLPERT

DESIGN | GEOSPATIAL | INFRASTRUCTURE
Challenges- Conversion

- IFC handling of the columns
- Custom Attributes (Room ID) in Revit
- Coordinate System
2D Geodatabase
3D Shapefile
3D Shapefile
2D Data Used in Web Application and Desktop

• Display floors around campus
• Find detailed information about a room
  • Organization
  • Department
  • College
  • Room Type
  • Function
  • Sub Room Type
  • Capacity
  • Room Number/Space ID
• Display building assessments
  • Interior Finishes
  • Exterior
  • Life Safety
  • Accessibility
  • Plumbing
  • HVAC
  • Electrical
Floorplans Link to Space Data (SIMS)

Select Layer: 01

You can choose from the above drop-down if multiple items are selected.

Clear Selection

SPACEID: 281-01-0160

Room Number: 0160
Room Type: 1C-Lecture Hall
Sub Room Type: null
Area: 4575.49
Organization: ADM-Medicine Administration (100%)
Function: A-Instruction and Instruction Support
Capacity: 75
Comment: null

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Comment: null
Categorization and Query of Space Utilization
Buildings Link to Building Assessment Database
3D Data
3D Data
3D Data
3D Data
LiDAR Extracted Buildings & 3D Shapes From BIM
Questions?

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