



# 2008 BIM Symposium

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# Agenda

- Personal BIM Experience
- Overview of BIM
  - Types of BIM
  - Benefits of BIM
- Pirtle Construction Experience – FAU/UF Joint Use Facility
- Industry In-House BIM Capabilities



## Personal BIM Experience

### •Skanska USA Building

- Responsible for creating Skanska's internal BIM department
- Clients Include:
  - Duke University
  - UNC Chapel Hill
  - Harvard University
  - MIT
  - Schering-Plough
  - Merck & Co.

### •Pirtle Construction Company

- Using BIM Technology on 2 South Florida Construction Projects
  - FAU/UF Joint Use Facility
  - Children's Reading Center and Museum



# BIM - the AEC's Quantum Leap

**BIM (Building Information Modeling)** – design practice whereby each element of a building is modeled three dimensionally and contains intelligent data, including work breakdown with structure, quantities, schedule, costs, etc.

## **Building Information Modeling:**

- Supports the extended building enterprise (owners, design, construction partners, etc.)
- Spans the entire project lifecycle.
- Integrates people, processes, business systems, and computable information.
- Enables global work-sharing, integrated practice, and integrated project delivery



# BIM Definitions

**Clash Detection** – Analysis of the interference of building systems with structure, architecture or other systems

**Time-phased** – Planning representing specific points in time that detail the progression of a construction project

**Virtual Design and Construction** – Synonymous with BIM

**Visualization** – Illustration of a project or of construction sequencing to help project teams plan and communicate



## Comparing CAD to BIM

<b>CAD</b>	<b>BIM</b>
2D	3D, 4D (time), 5D (cost), 6D (carbon)
Explicit "Simple" geometry	Object-based "smart" geometry
Manual coordination	Automated coordination
Knowledge lost	Knowledge captured



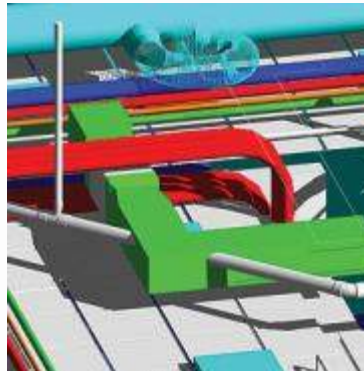
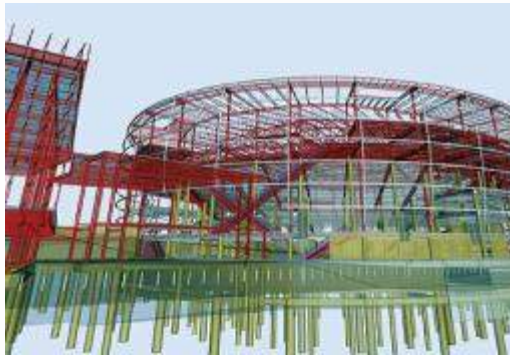
# Types of BIM

3D	3D Visualization
4D (time)	Includes Project <b>Schedule</b> in the 3D Visual Design
5D (cost)	Includes both Project <b>Schedule</b> and Project <b>Cost</b> in the 3D Visual Design
6D (carbon)	Includes both Project <b>Schedule</b> and Project <b>Cost</b> and Integrates <b>Sustainable Design Components</b> in the 3D Visual Design



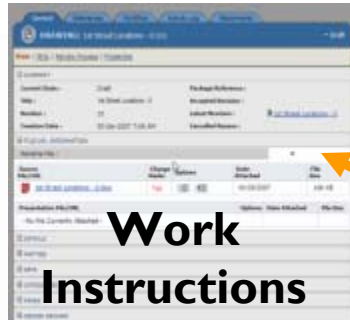
# Key Concepts of BIM

- **3D Coordination**
  - Fewer surprises, less risk to schedule and budget
- **4D Sequencing**
  - More accurate logistics and planning
- **5D Estimating**
  - More accurate bids, less risk to schedule and budget
- **Value Engineering**
  - Quicker design optioning and visibility into cause and effect upon schedule and budget
- **Reduced RFI's and Change Orders**
  - Less time and expense due to delays.





# Platform Application Exchange



**Work  
Instructions**

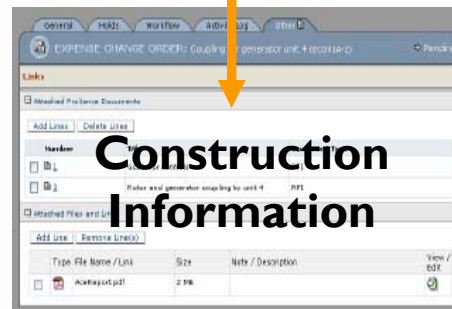


Entity	Approved Original Budget	Approved Changes Budget	Pending Change Budget	Proposed Total
Fulton County	11,123,703.00	11,969,303.00	8,554,950.00	79,194,000.00
Cost Account				
Adams Middle School	18,150,000.00	0.00	447,000.00	18,697,000.00
Brownlow High	8,500,000.00	8,950,000.00	828,500.00	18,278,500.00
Fulton K-8	8,820,000.00	0.00	2,810,000.00	4,680,000.00
Franklin Junior High	2,820,000.00	2,810,000.00	0.00	4,630,000.00
Jackson K-8	2,820,000.00	0.00	0.00	3,910,000.00
Meigs Junior High	2,615,000.00	0.00	0.00	7,610,000.00
North Elementary	3,110,000.00	0.00	1,170,000.00	4,480,000.00
Madison High School	1,120,000.00	0.00	1,120,000.00	4,190,700.00
North Elementary	0.00	0.00	0.00	4,410,000.00
Townsend Middle	0.00	2,376,000.00	2,600,000.00	2,407,000.00
Wilshire Elementary	1,120,000.00	1,120,000.00	2,110,000.00	4,200,000.00
East High School	4,500,000.00	847,000.00	0.00	6,612,000.00
Meigs County	10,000,000.00	8,811,500.00	0.00	43,870,500.00
Cost Account				
East Middle School	4,445,000.00	765,000.00	0.00	2,810,000.00
East High	4,420,000.00	765,000.00	345,000.00	3,900,000.00
East Junior	6,820,000.00	0.00	0.00	4,121,400.00
East Senior	4,500,000.00	0.00	0.00	3,500,000.00
East Elementary	4,800,000.00	0.00	0.00	4,400,000.00
East Junior High	3,200,000.00	0.00	0.00	4,120,900.00
East Senior High	4,120,000.00	0.00	0.00	3,810,000.00
East Senior High Upgrade	770,000.00	0.00	0.00	770,000.00
East Senior High	2,810,000.00	0.00	0.00	4,870,000.00
Grand Total	76,178,718.00	15,564,100.00	16,105,760.00	117,848,578.00

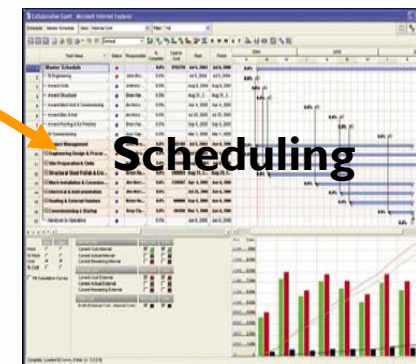
**Budget &  
Cost**



**Specifications  
& Contracts**



**Construction  
Information**



**Scheduling**

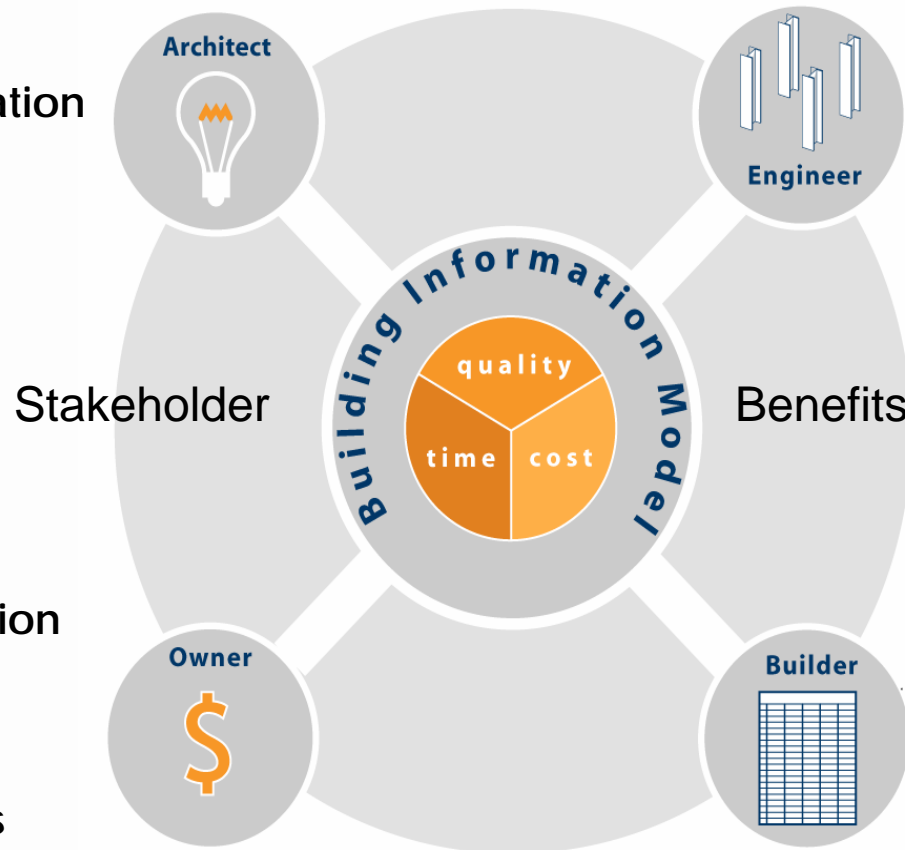
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# Key Concepts of BIM

- More Time to Design
- Less Drafting
- Quick Visualization
- Better Design Presentation

- Early Visualization
- Shorter Construction
- Fewer Surprises
- Less Rework



- Optimized Design
- Less Drafting
- Effective Design Coordination

- Accurate Estimation
- Improved Constructability
- Streamlined Communication



# FAU/UF Joint Use Facility



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## Managing B4UB Process Coordination

### Ziggurat 3D Program:

2D AutoCAD drawings (Architectural, MEP and Structural) are used to build a 3D model for the proposed project at any stage of the design, or prior to construction using the complete construction documents.

The analysis also provides the following:

#### **1. System Coordination**

- 1.1 Conflict checks
- 1.2 M.E.P Clearances
- 1.3 Structural shafts and openings
- 1.4 Architectural and Structural drawings coordination

#### **2. Space Management**

- 2.1 Space optimization- Zoning and Volume Analysis
- 2.2 Rule based clearances
- 2.3 Project Requirements

#### **3. Documents Control**

- 3.1 Cad Standard Check-File and Layer Naming Convention
- 3.2 DWG files drawings structure
- 3.3 Matching references.

**Such coordination can save in construction time & costs.**



## Input

## B4UB Process

## Output

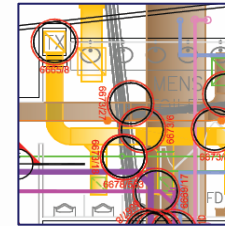
**2D CAD Drawings (Design Team)**



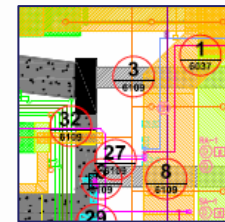
**Codes and Rules**



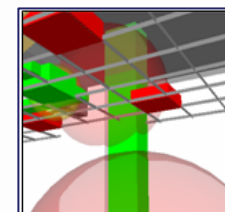
**Specific Project Requirements**



**Conflict Analysis and Web Reports**



**Analysis Layer overlaid on CAD Drawings**



**3D WEB and CAD Model**



# Conclusions and Recommendations

## A full building analysis includes:

1. Specific guidelines for each design team member.
2. Optimization of plenum and space.
3. Full systems coordination allocating all conflicts.
4. Analyzing clearances for maintenance, installations and accesses.
5. Supporting other specific requirements of project.

### **Mechanical System**

Maximum Gross height defined -following a zone and volume analysis.

### **Plumbing**

Designated zones cleared for sanitary drain slopes.

### **Fire Protection**

Optimizing majority of pipes to be placed at the same level.

### **Electricals**

Maintenance and accesses clearances for future needs.  
Clearing all water systems from predefined zones.

### **Structure**

Coordinated all openings and shafts descending through all levels  
Sending needed wall openings to structural engineer for approval.

### **Architecture**

Reflected Ceilings levels, type, and physical gross volume to be carefully coordinated – to allow a better usage of plenum by that enabling higher ceilings.

## **Benefits**

- **Identifies Conflicts Prior to Construction**
- **Improves Quality Control**
- **Cost Savings**
- **Construction Time Savings**



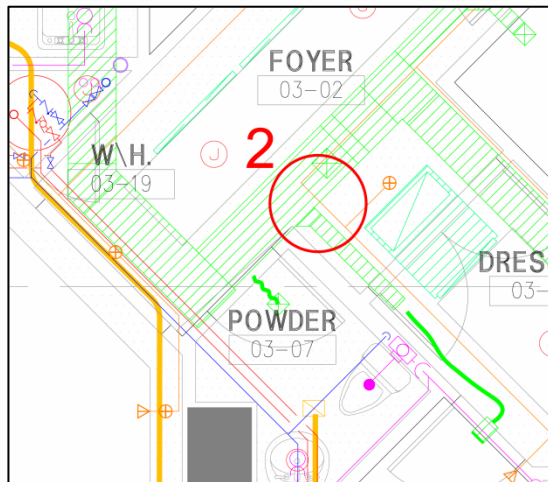
# Level 1: Conflict Example #1

## Mechanical Systems VS. Fire Protection System

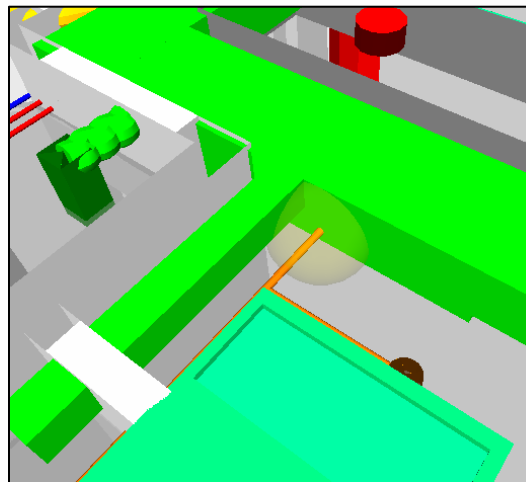


Sprinkler pipe cannot pass through that path. Not enough space between Supply duct and reflected ceiling.

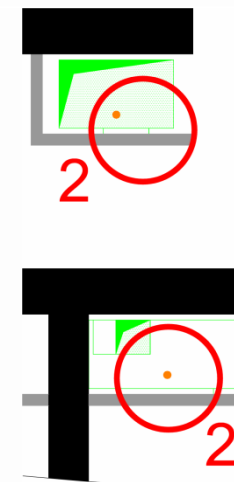
**Superposition Layout**



**3D Interactive Report**



**Local Sections**

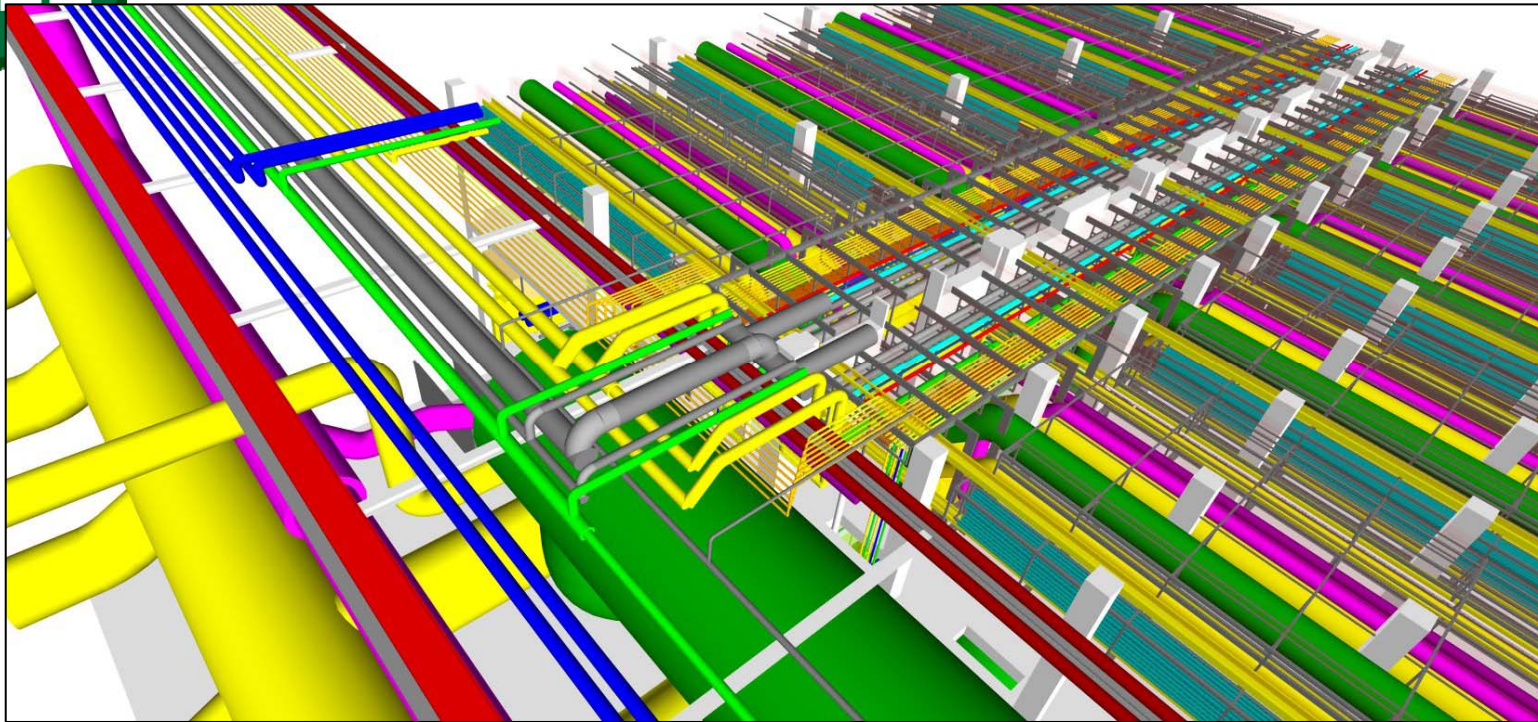


RID:001

Link: <http://www.zigguratb4ub.com/request.htm?requestID=001&fileTypeID=0001>

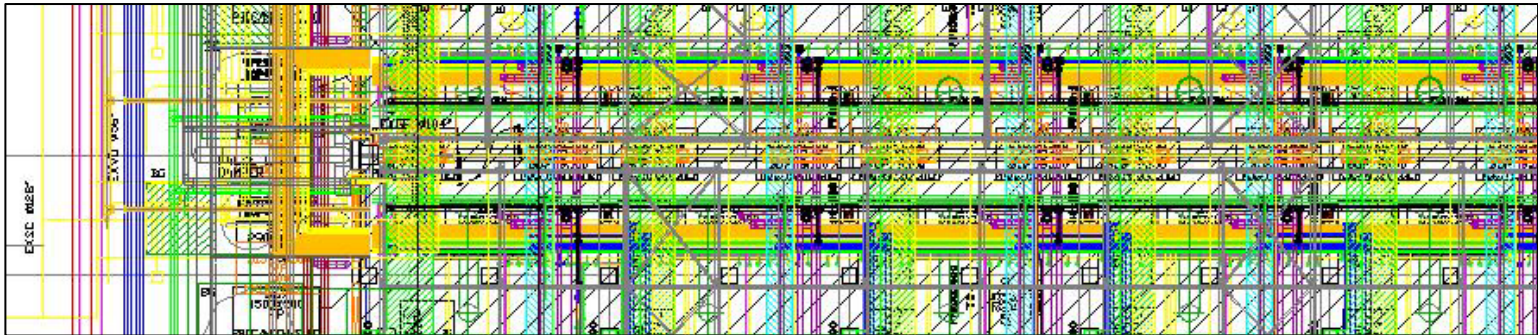


**3D Information Model Top View**



**Nano Technology - FAB**

**2D Partial Layout**



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# BIM In House Capabilities



Einhorn Yaffee Prescott  
Architecture & Engineering P.C.

*Experts in Science and  
Technology Environments*



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# Enter Ziggurat B4UB Online Interface

## Conflict Systems Analyzed and Viewed

The screenshot displays the PIRTLE online interface for the Ziggurat B4UB project. The interface includes a top navigation bar with buttons for 'View All', 'Look Around', 'Examine', 'Walk', 'Fly', 'Turntable', 'Select', 'Zoom', 'Pan', 'Orbit', 'Zoom Box', 'Refresh', 'Regenerate', and 'Report'. A vertical list of levels (1, 4, 5, 6, 7, 9, 10, 12, 14, 15, 16, 18, 20) is on the left, with level 9 highlighted. The main view shows a 3D model of the building's interior with various systems (HVAC, ducts, etc.) color-coded and overlaid on the structure. Below the 3D view is a table of conflict points and a detailed view of a specific conflict.

ID	Status	Component	Component	Clash Point	Distance		
5	Initial	M-HVAC-SUPP-DUCT	P-SANR-VENT	-850.375, 1567.252, 2477.500	-2.859	✓	✗
6	Rejected	M-HVAC-SUPP-DUCT	P-STRM	-369.380, 1435.420, 2475.845	-2.7	✓	✗
7	Rejected	M-EXHS-GRL	P-STRM	-945.101, 853.241, 2476.016	-2.602	✓	✗
8	Rejected	M-HVAC-SUPP-DUCT	P-STRM	-478.891, 1403.500, 2477.647	-2.498	✓	✗

Conflict Between: M-HVAC-SUPP-DUCT, P-STRM

save

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# Ziggurat Online 3D Walkthrough

Full Building Systems Integrated for client viewing



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