

BIM for Life-Cycle Planning and Design



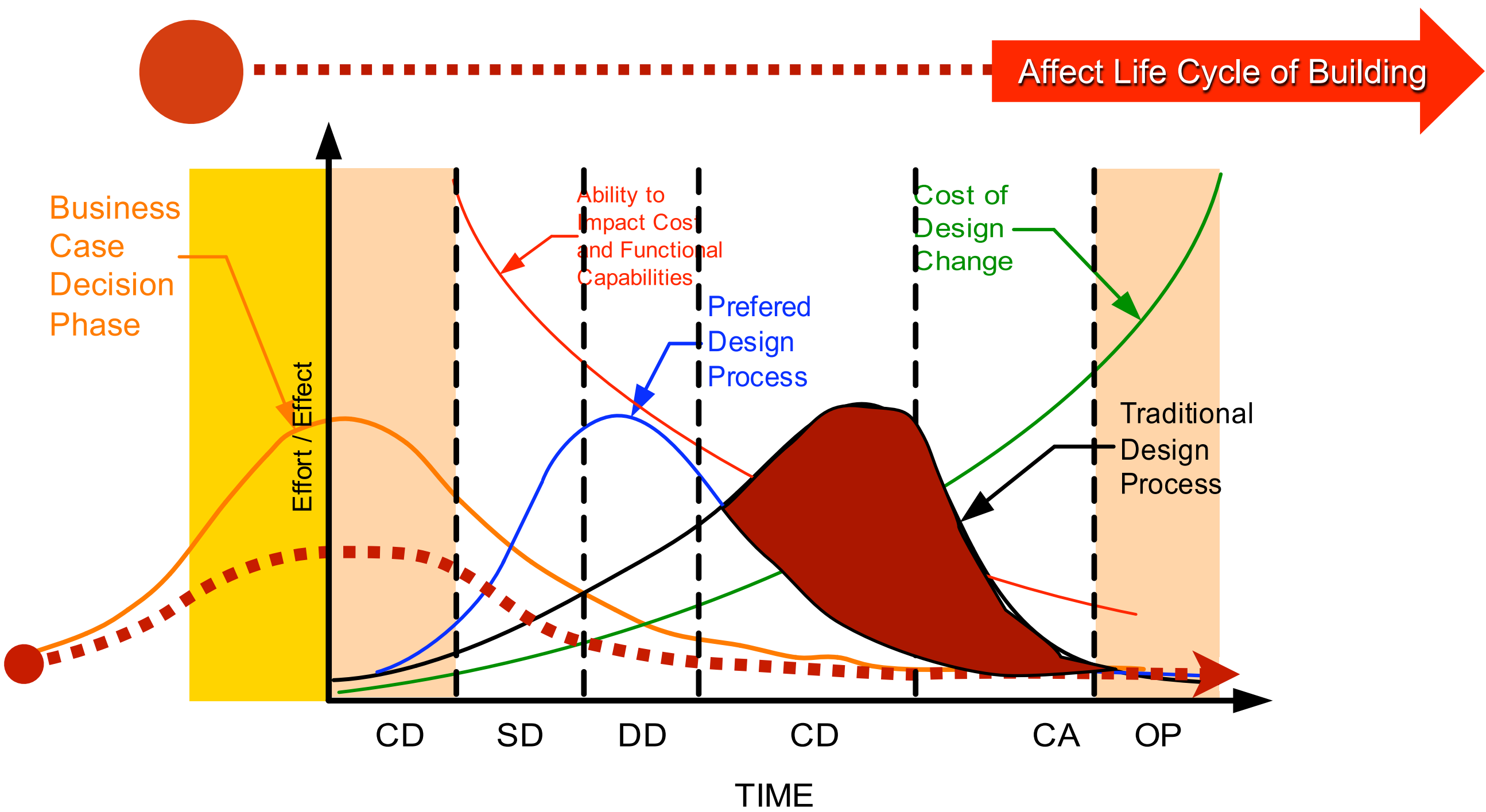
Presented by:
Kimon G. Onuma, FAIA

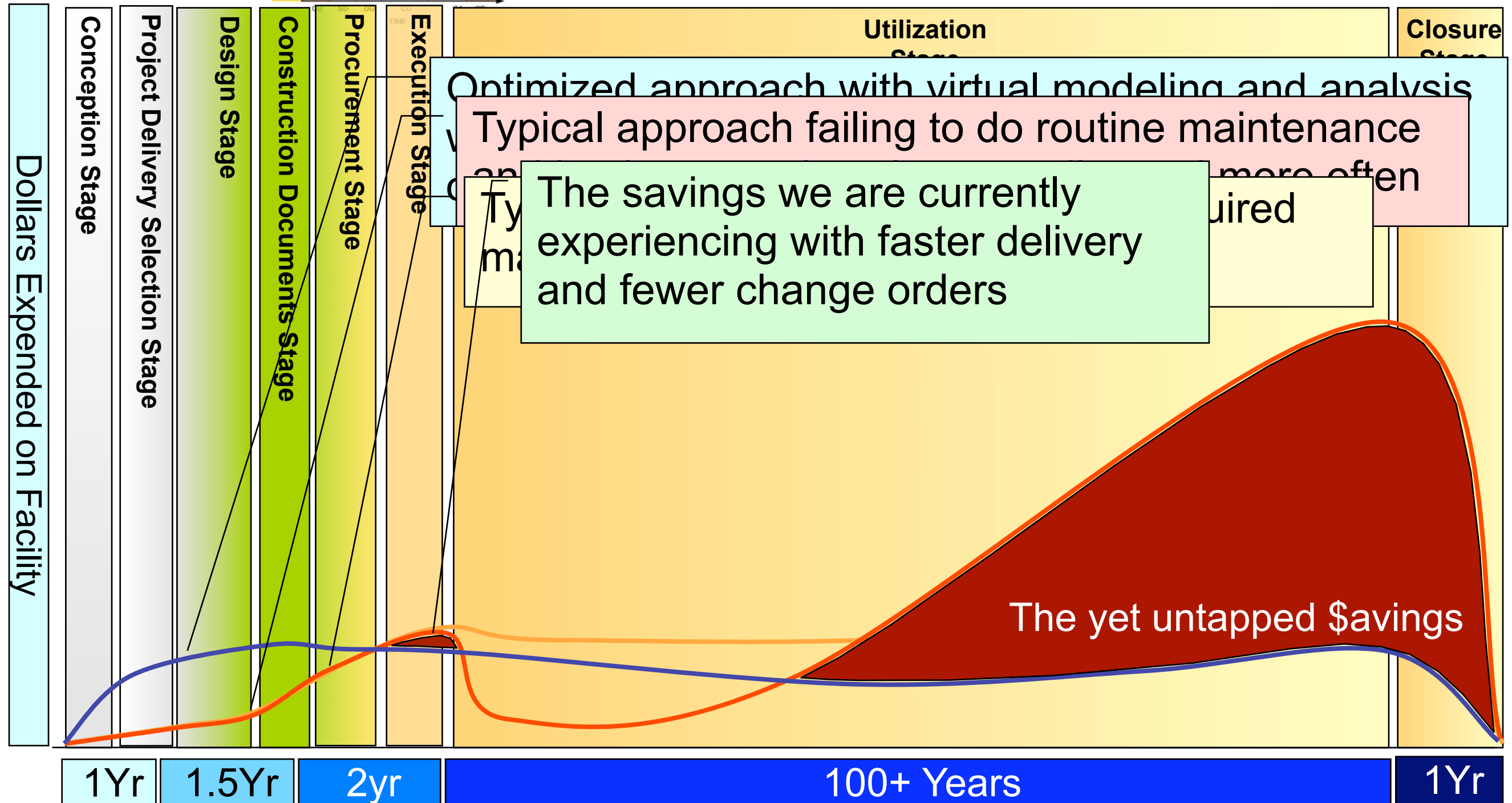
buildingSMARTalliance™



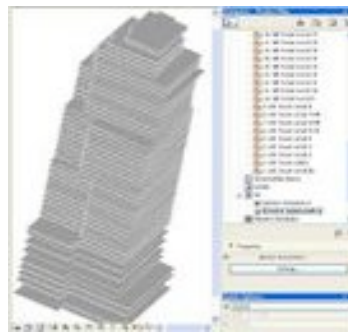
Presented by:
Kimon Onuma, FAIA
ONUMA, Inc.

Decisions Here





Open Standards in the Center



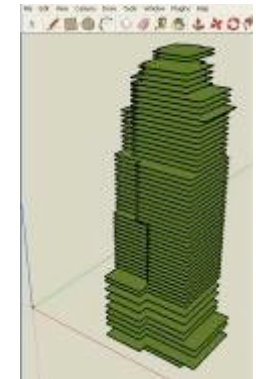
Archicad
IFC



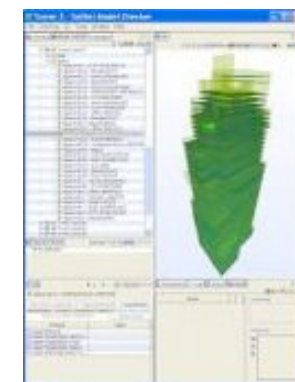
VectorWorks
IFC



DProfiler



SketchUP
IFC



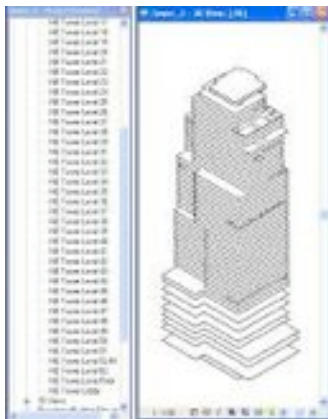
Solibri - IFC



Onuma Planning System
IFC



DDS-CAD - IFC



Revit Architecture
& Structure - IFC



Who Owns The BIM?



Owner



Architect

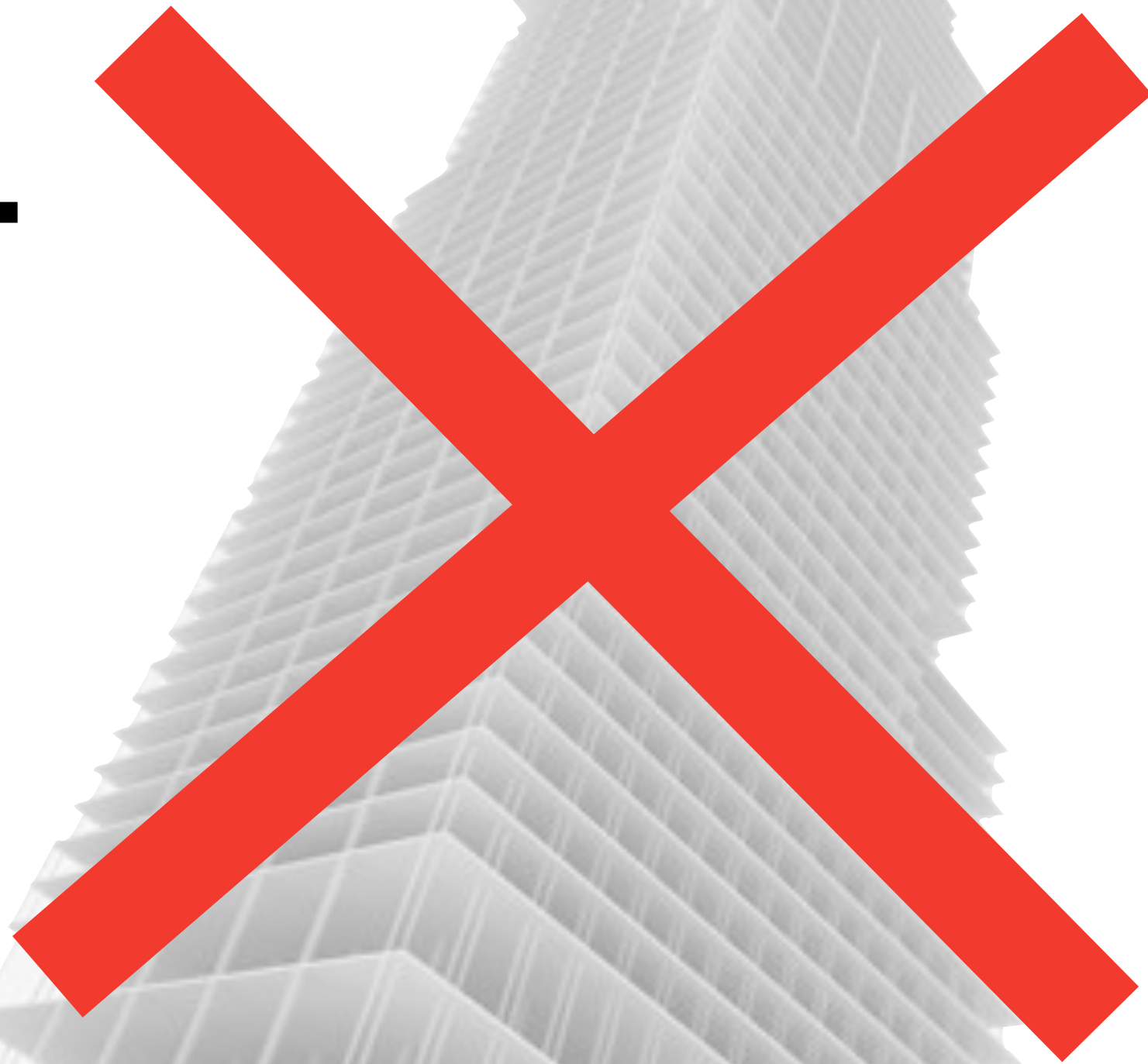


Engineer



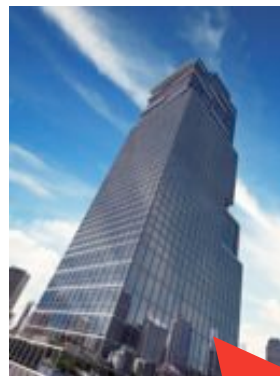
Contractor

It is
NOT
One
BIM





Architect



Arch.



Contractor

One Standard



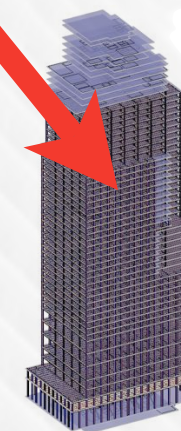
TM



Engineer



Mech.



Struct.



Engineer

Many BIMs



Architect



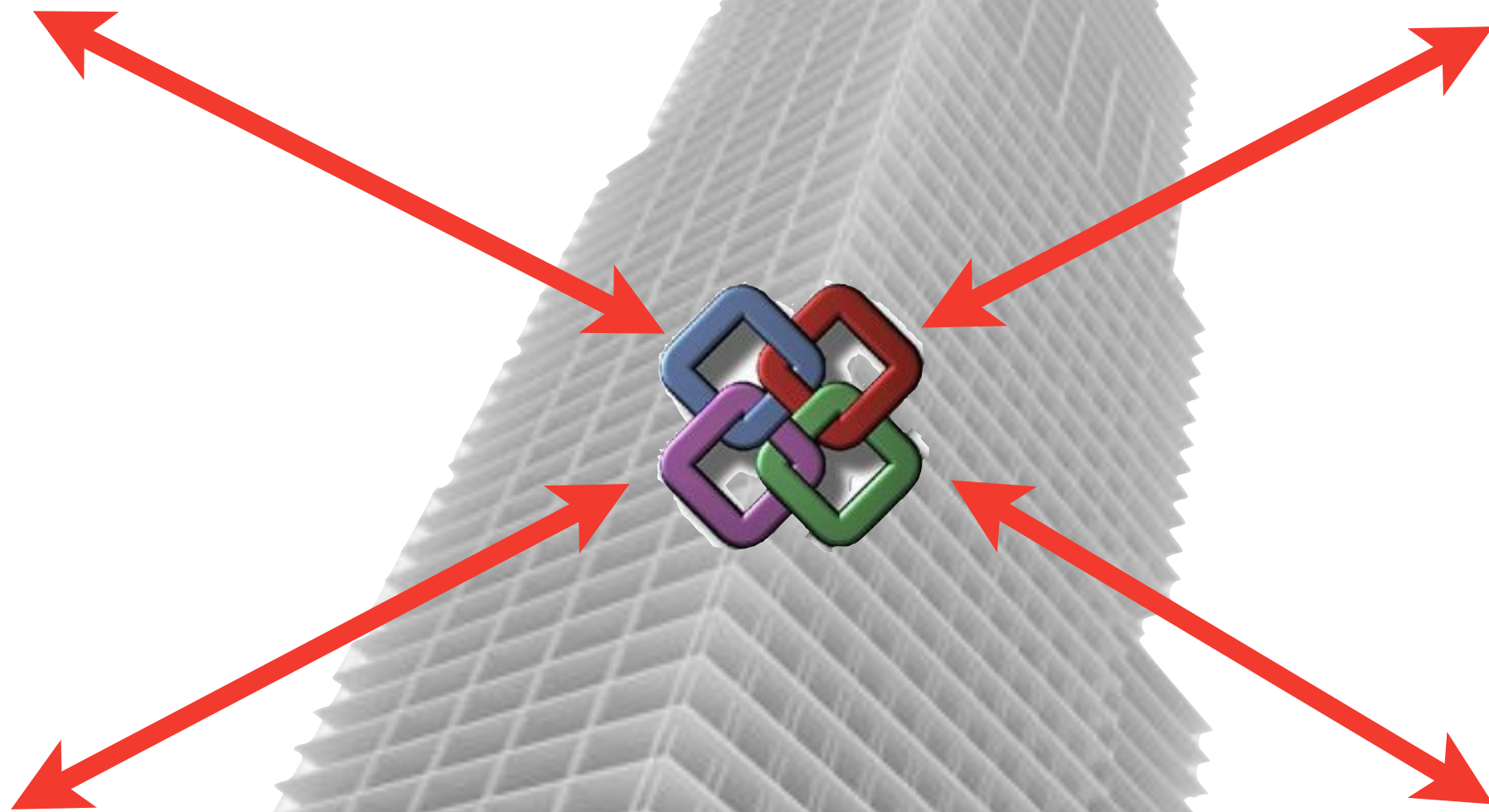
Contractor



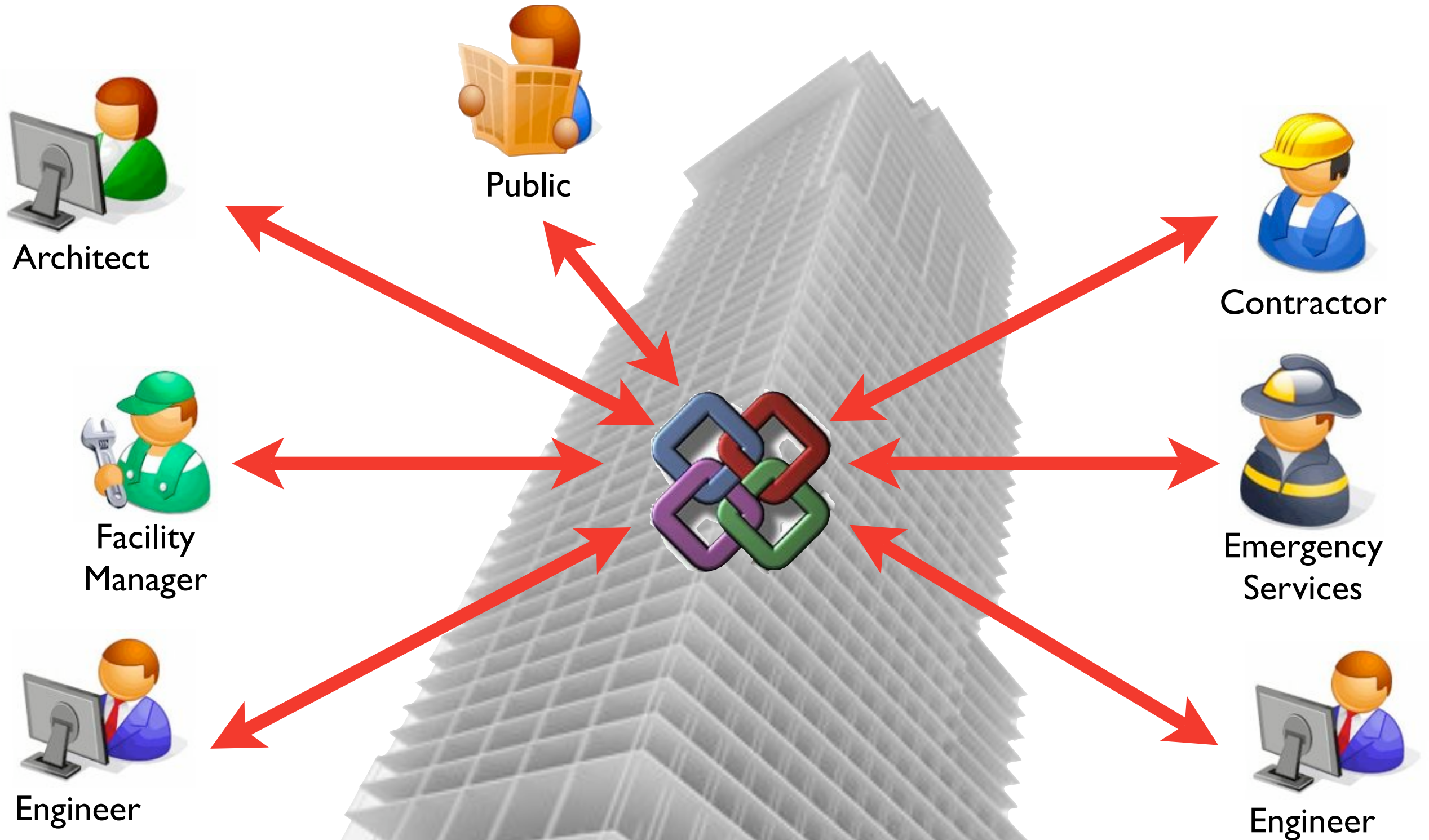
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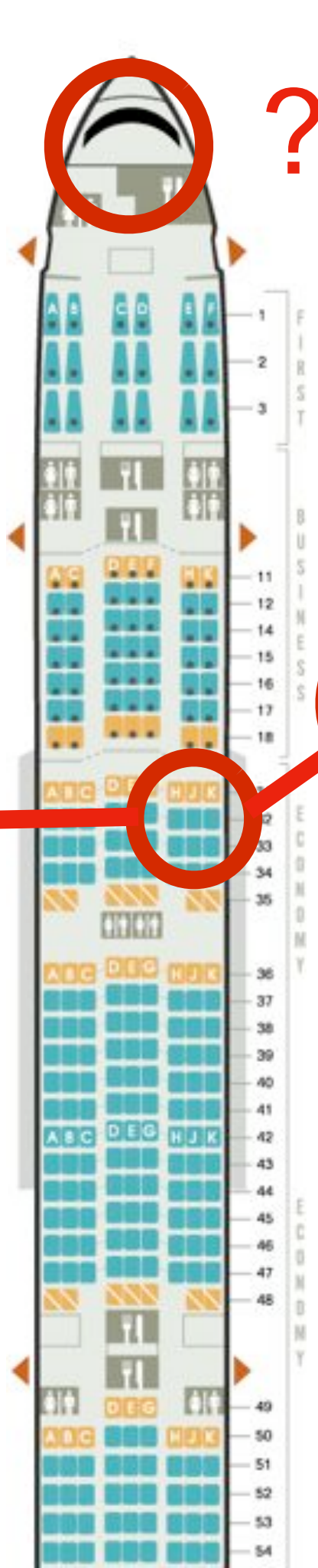
Engineer



Accessible to All



Accessible to All



on Interstate 395 one mile from the subway ...
Arlington (DMM: 1.1.5.1.1)

[Price details](#)

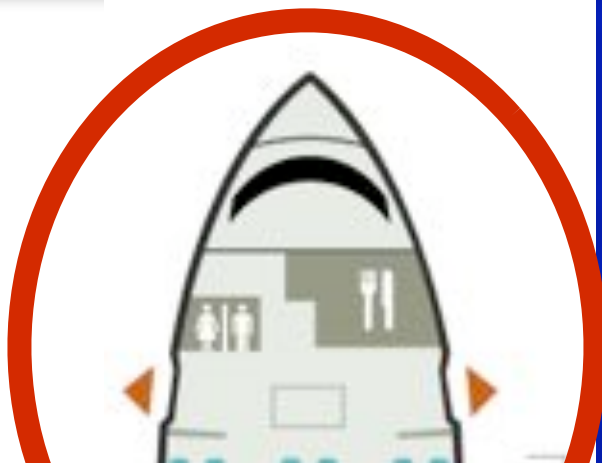
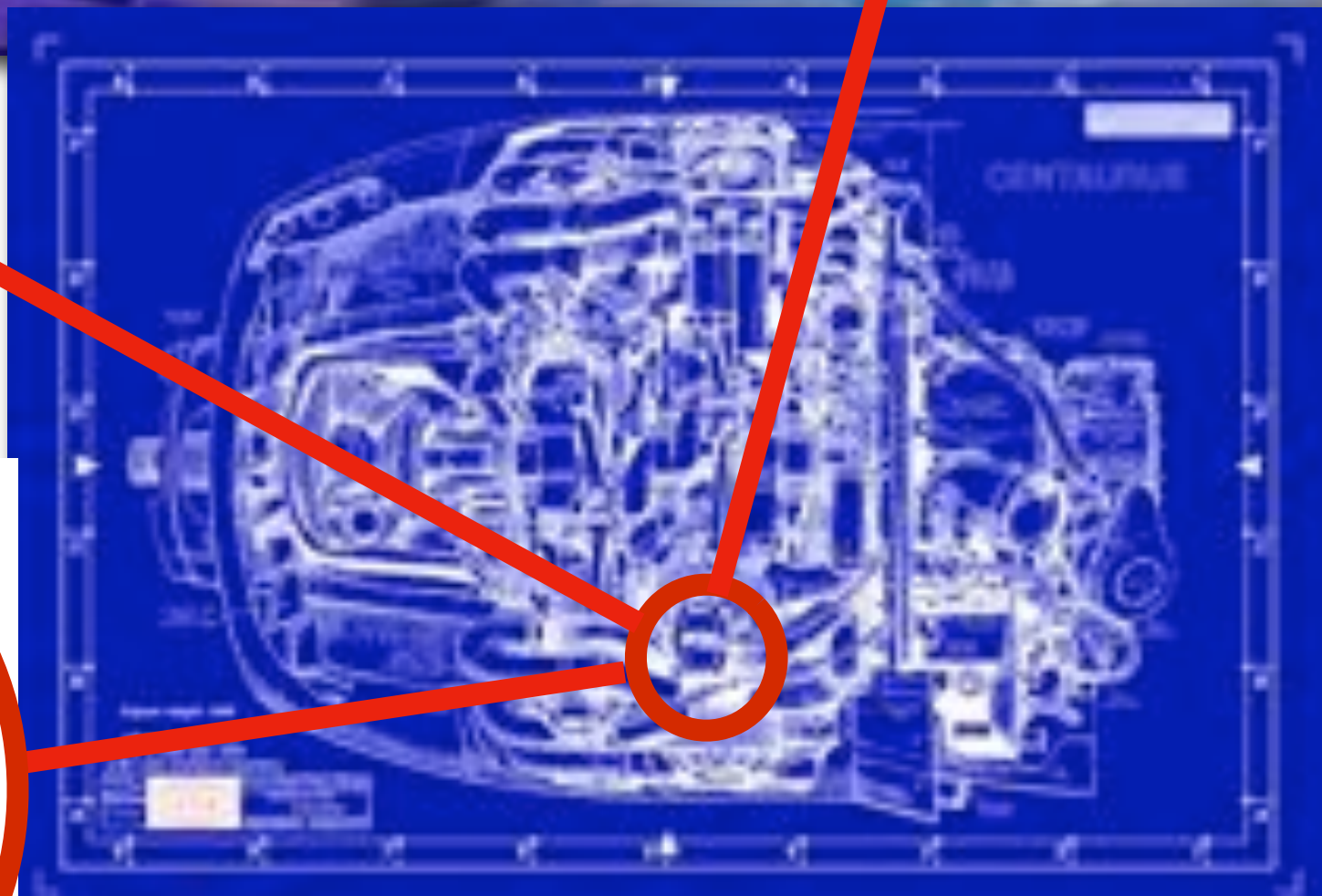
\$1351

(BIM Model of Hotel Room by AEC Infosystems)

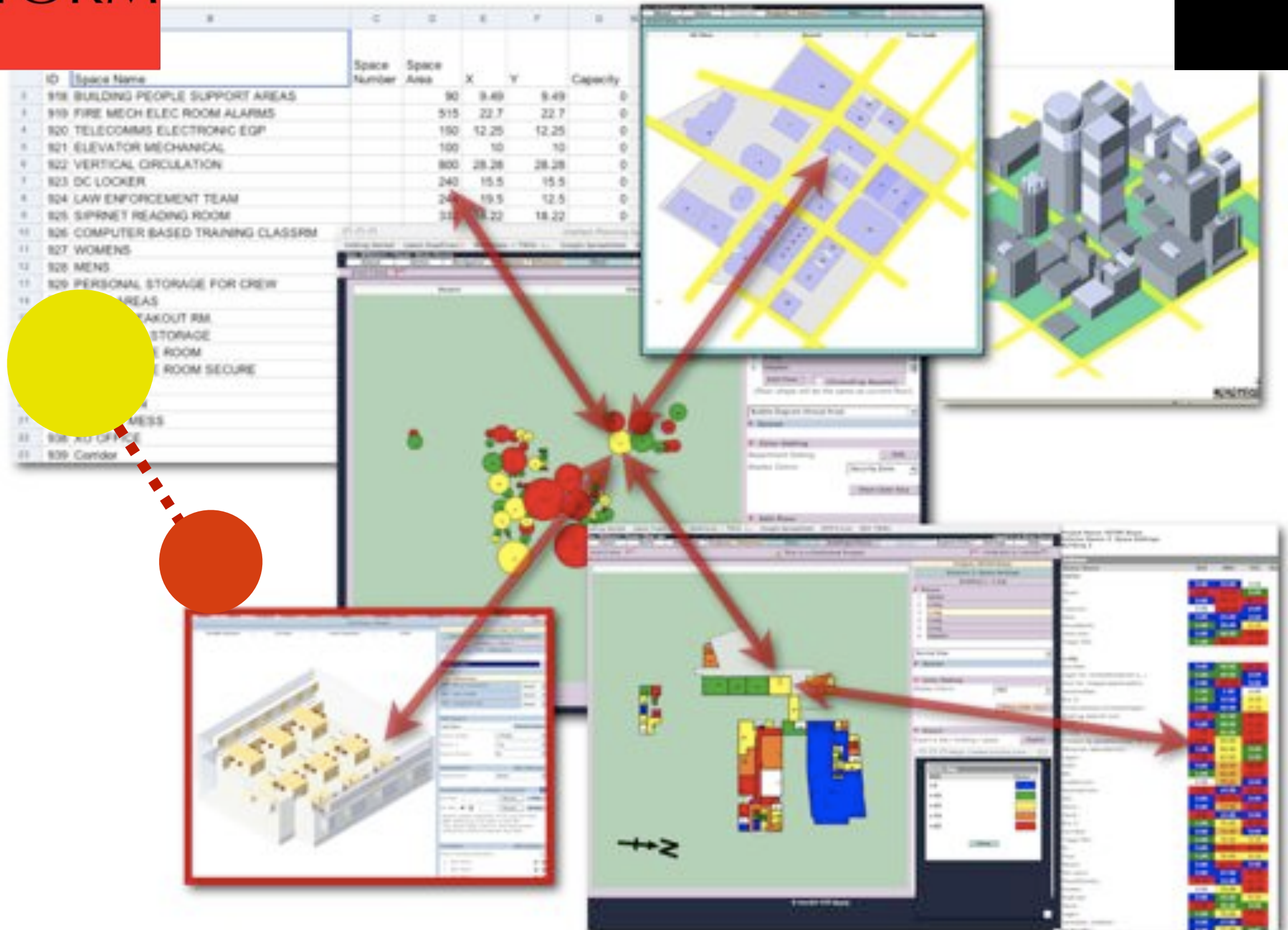


to the amateur photographer:
professional architectural pho
the nation's capital. [More...](#)

Expedia does it.



Onuma Planning System



Space Name	Floor Number	Space Area
Offices	40	4500
Conference	40	2300
<hr/>		
Gym	39	13450
Training	39	2400
Storage	39	400
<hr/>		
Retail	1	7600
Restaurant	1	12800
Lobby		6700
Total SF		622,173

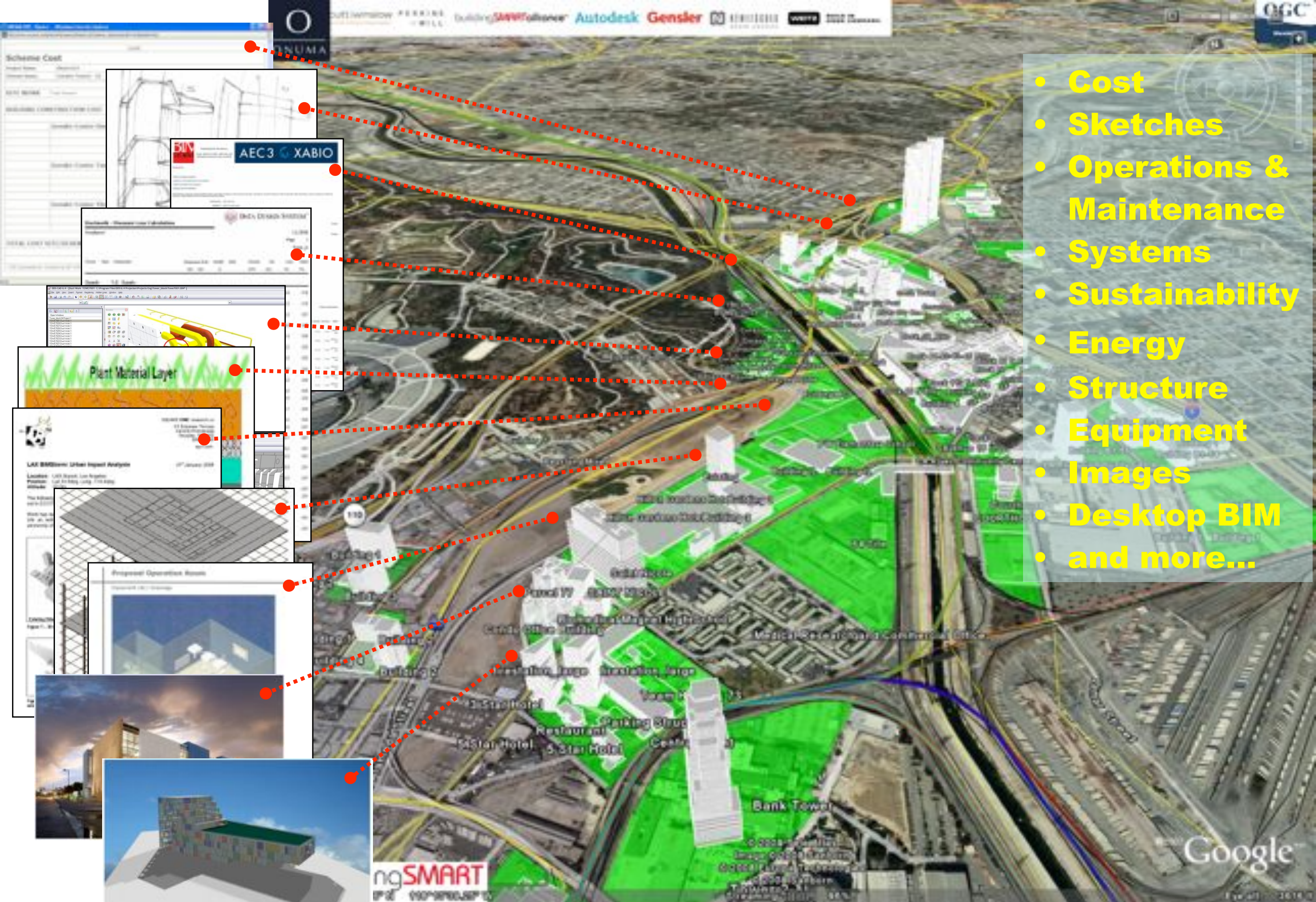


3D Model
by
Square I

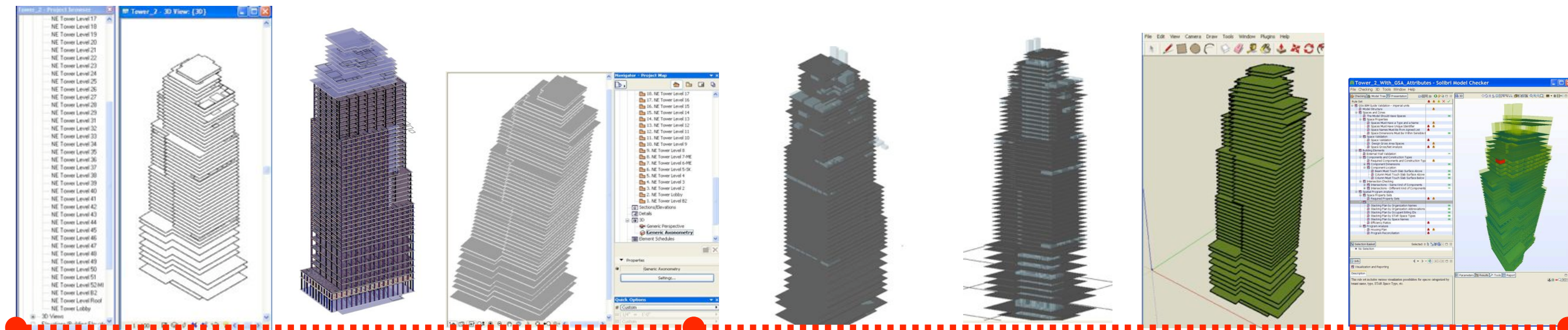
Budget: \$80,000,000	Budget: \$80,500,000	Budget: \$81,600,000	Actual: \$79,567,231
Floor Area: 85,000 SF	Floor Area: 85,000 SF	Floor Area: 85,700 SF	Floor Area: 84,540 SF
-	Glazing Area: 20,000 SF	Glazing Area: 19,000 SF	Glazing Area: 21,242 SF
-	5 Floors	6 Floors	6 Floors



- 24 Hours
- 11 Countries
- 133 Players
- 420 Buildings
- 54,755,153 SF
- Equivalent of 2,800,000 pages of documents.
- Zero Miles Travelled to assemble in one location....



- **Cost**
- **Sketches**
- **Operations & Maintenance**
- **Systems**
- **Sustainability**
- **Energy**
- **Structure**
- **Equipment**
- **Images**
- **Desktop BIM**
- **and more...**



Revit Architecture
& Structure - IFC

Archicad
IFC

VectorWorks
IFC

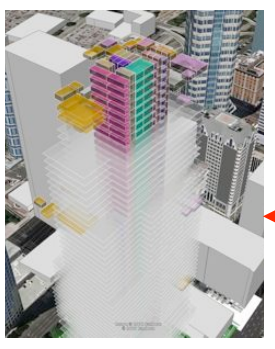
Nemetshek
IFC Viewer

SketchUP
IFC

Solibri
IFC

Onuma Planning System
IFC, KML, GBXML, CSV

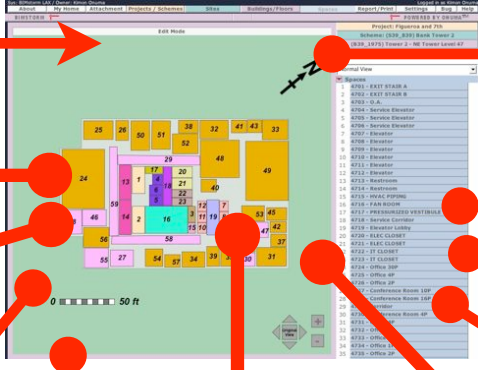
Google Earth



BIM ON DEMAND

Space Name	Floor Number	Space Area
Offices	40	4500
	40	2300
	39	13450
	39	2400
	39	400
Retail	1	7600
Restaurant	1	12800
Lobby	1	6700
Total SF		622,173

Excel



BIM REPORTS

Building Cost Estimate	
Project Name	Project 2
Building Name	Building 2
Building Number	Building 2
Building Type	Building 2
Building Area	Building 2
Building Volume	Building 2
Building Height	Building 2
Building Depth	Building 2
Building Width	Building 2
Building Length	Building 2
Building Thickness	Building 2
Building Density	Building 2
Building Mass	Building 2
Building Weight	Building 2
Building Force	Building 2
Building Moment	Building 2
Building Torque	Building 2
Building Power	Building 2
Building Energy	Building 2
Building Water	Building 2
Building Gas	Building 2
Building Electricity	Building 2
Building Heat	Building 2
Building Cooling	Building 2
Building Ventilation	Building 2
Building Lighting	Building 2
Building Acoustics	Building 2
Building Vibration	Building 2
Building Seismicity	Building 2
Building Wind	Building 2
Building Snow	Building 2
Building Rain	Building 2
Building Hail	Building 2
Building Ice	Building 2
Building Frost	Building 2
Building Dew	Building 2
Building Fog	Building 2
Building Clouds	Building 2
Building Sun	Building 2
Building Moon	Building 2
Building Stars	Building 2
Building Planets	Building 2
Building Galaxies	Building 2
Building Universe	Building 2

Reports



FFE

KML

IFC

IFC

IFC

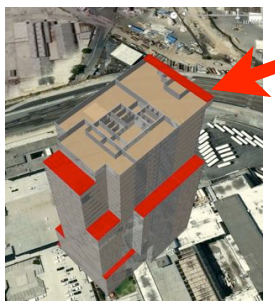
IFC

BIM

IFC

Whitestone
O&M

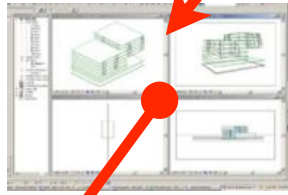
O&M



4D In GE



Elite CAD

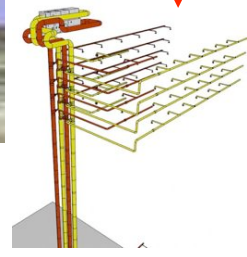


Revit

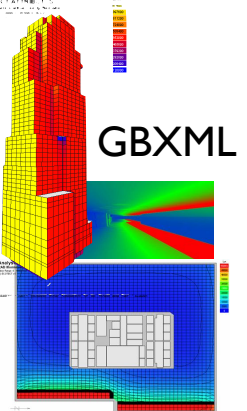
Rhino



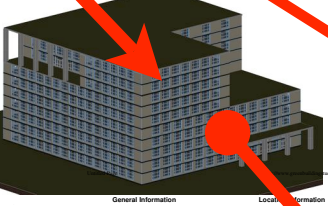
IFC



DDS CAD



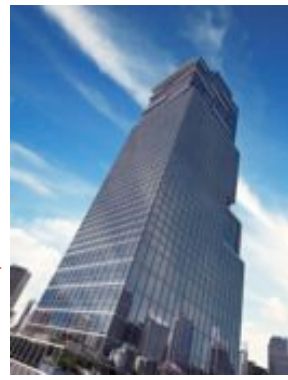
Ecotect



Green Building Studio

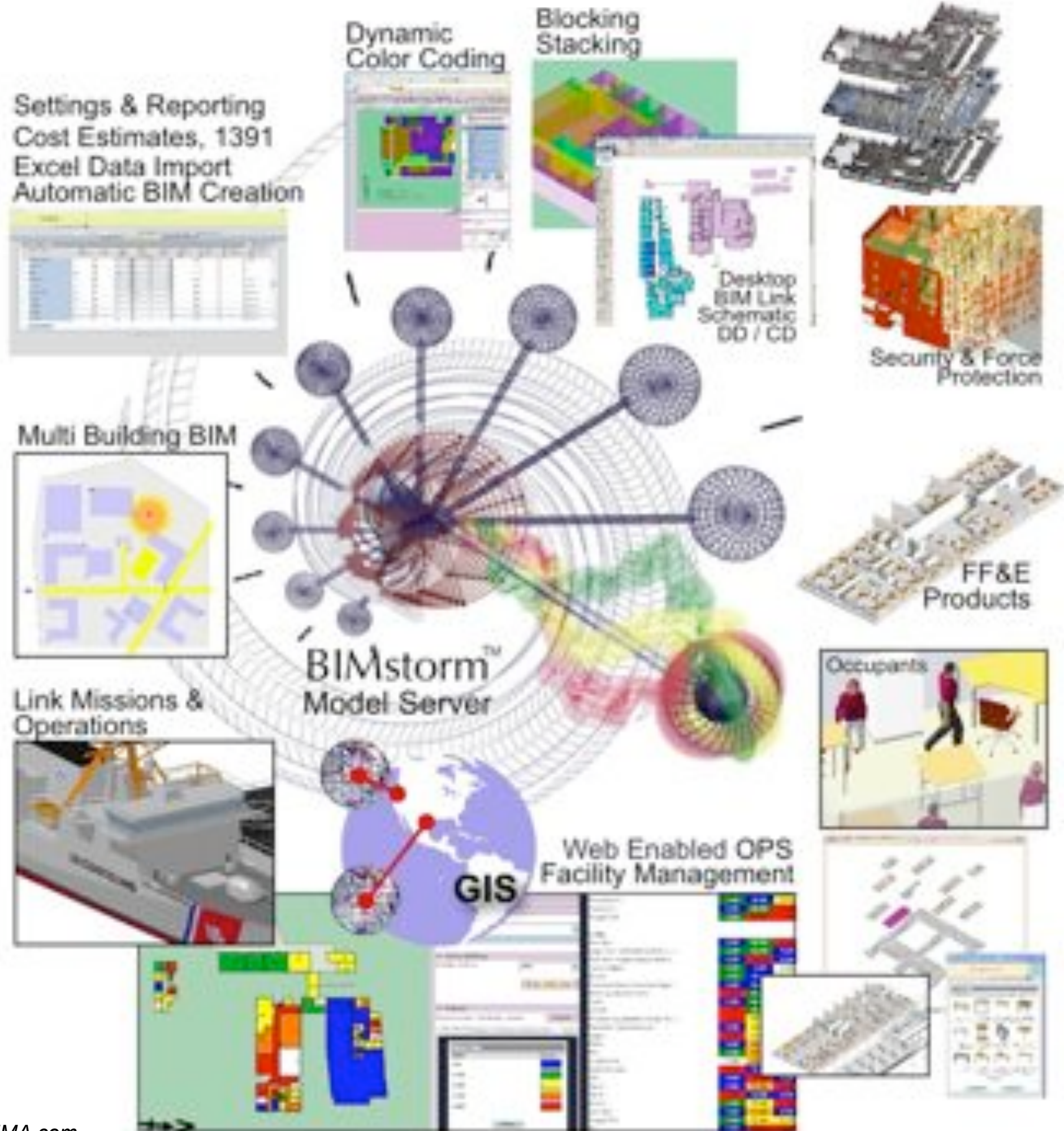
GBXML

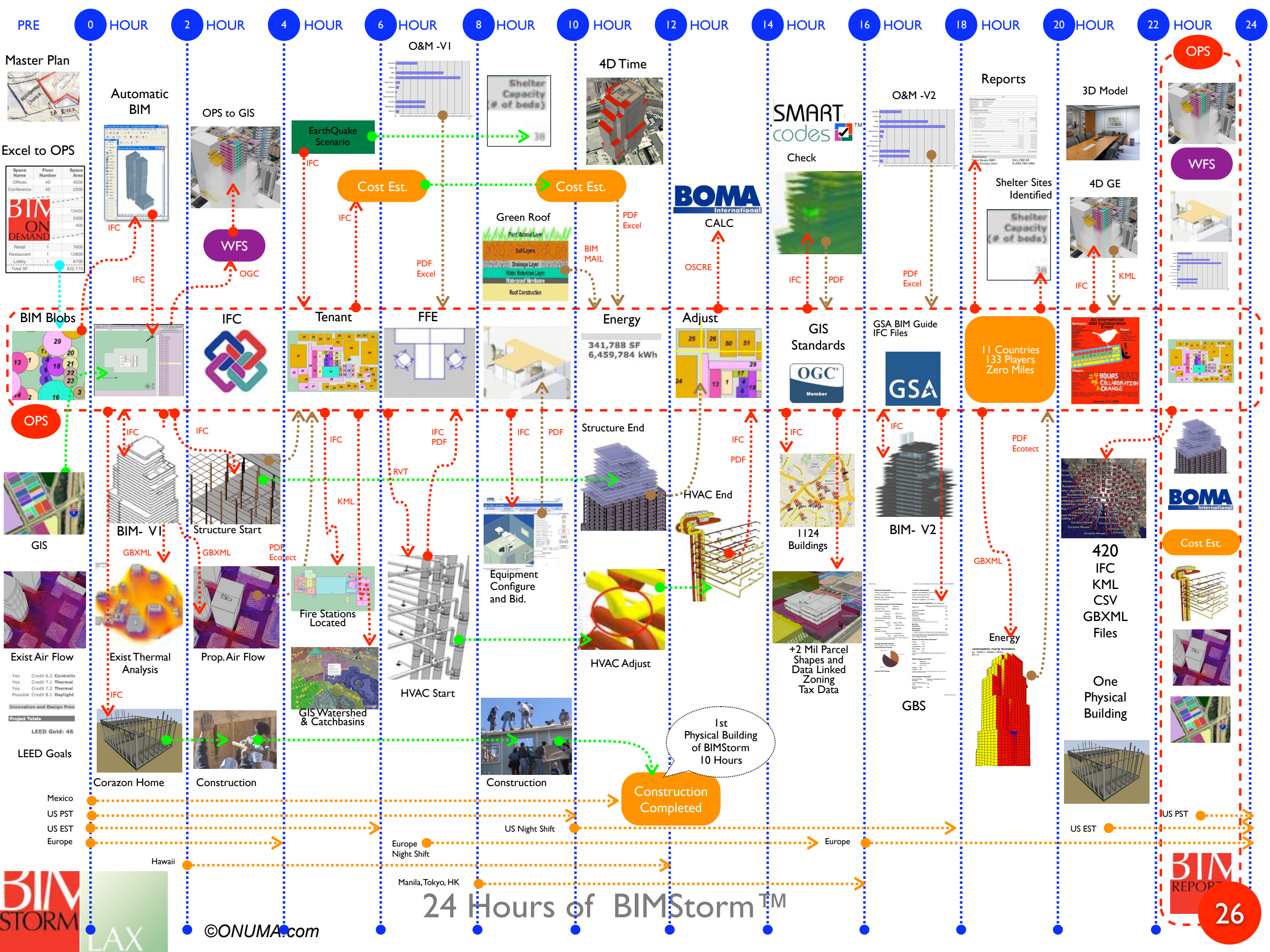
General Information	
Project Name	Project 2
Building Name	Building 2
Building Number	Building 2
Building Type	Building 2
Building Area	Building 2
Building Volume	Building 2
Building Height	Building 2
Building Depth	Building 2
Building Width	Building 2
Building Length	Building 2
Building Thickness	Building 2
Building Density	Building 2
Building Mass	Building 2
Building Weight	Building 2
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Building Dew	Building 2
Building Fog	Building 2
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Building Sun	Building 2
Building Moon	Building 2
Building Stars	Building 2
Building Planets	Building 2
Building Galaxies	Building 2
Building Universe	Building 2

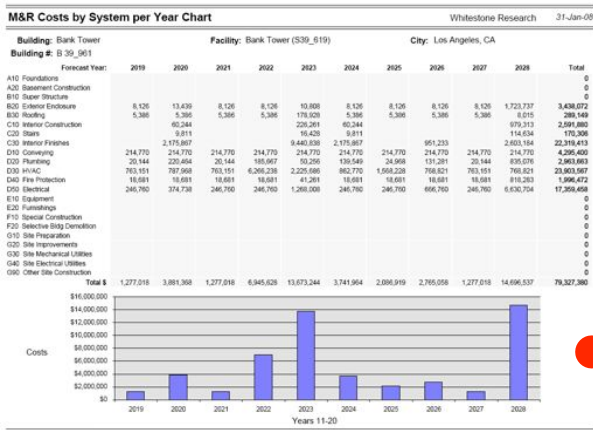


Acusourcing
3D Model

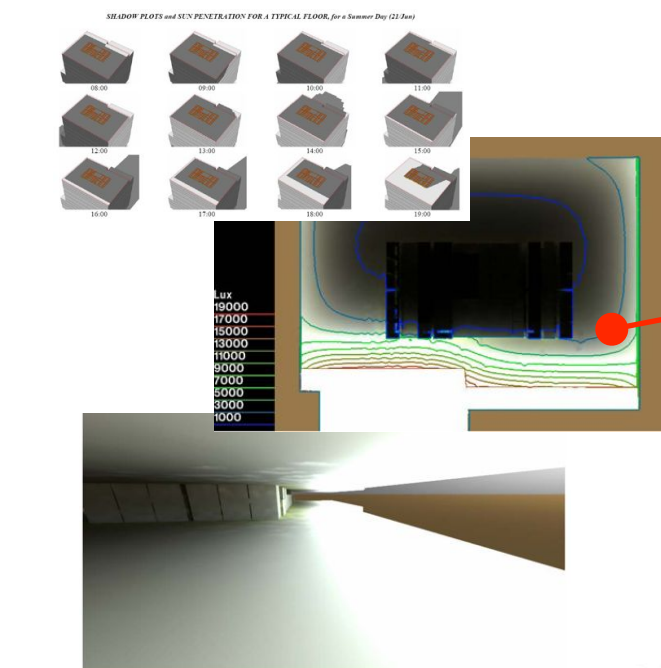
2/20/08







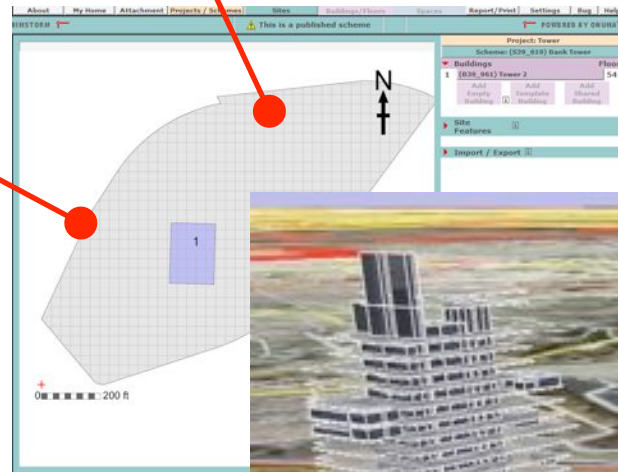
M&R Cost by System



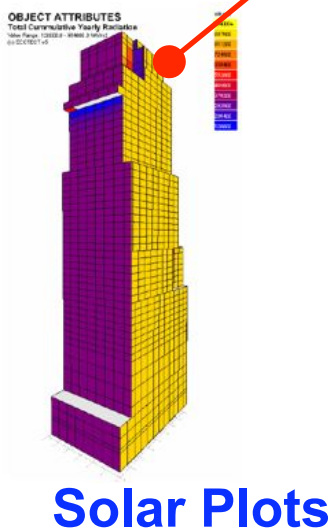
Daylight Studies



Illuminance Contours



Building in OPS



Solar Plots

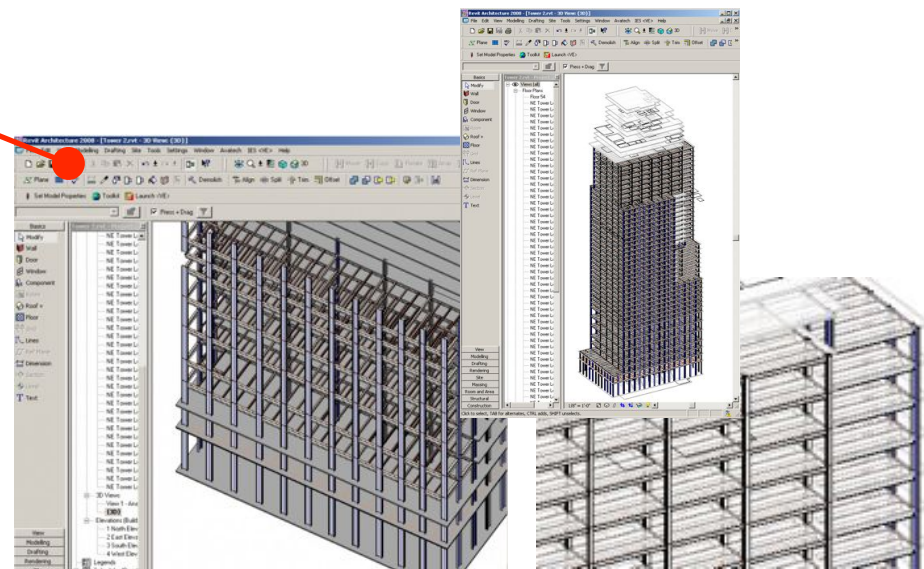
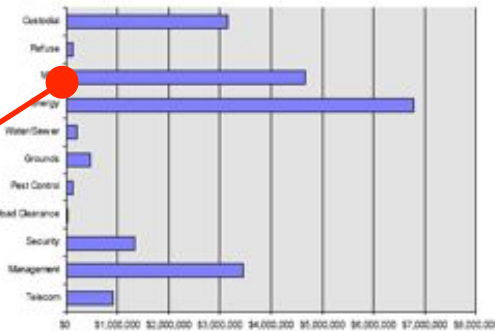
Operation Costs Summary

Building: Bank Tower
Building Number: B 39_961
Facility: Bank Tower (539_519)
City: Los Angeles, CA
Built Date: 2008

G8FT: 1,940,00
Replacement Value: \$326,937,474
Building Use: Office
Building Type: Corporate Office

Operation	Annual Cost/G8FT	Annual Total	Percent
Custom	\$1,627	\$3,185,004	14.3%
Refuse	\$0,072	\$139,098	0.7%
MBR	\$2,427	\$4,846,774	21.9%
Energy	\$3,465	\$6,779,320	31.8%
Water/Sewer	\$0,111	\$214,622	1.0%
Grounds	\$0,246	\$478,658	2.2%
Pest Control	\$0,085	\$165,130	0.8%
Road Clearance	\$0,020	\$38,800	0.2%
Security	\$0,625	\$1,247,524	6.3%
Management	\$1,758	\$3,466,537	16.2%
Telecom	\$0,475	\$922,002	4.3%
Building Total	\$11.90	\$21,334,489	100.0%

Operating Costs



Structural Engineering



Let the Experts Focus on Their Subject

© Onuma, AEC Infosystems

Digital Alchemy Building Code Checking:
SMARTcodes Code Checking Report for BIMstorm LAX

Organization: International Code Council
Date: 31-Jan-08

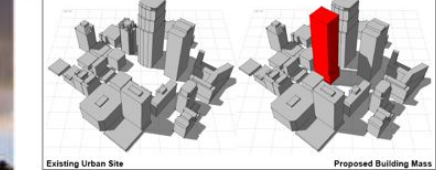
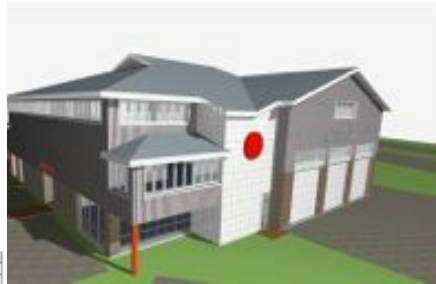
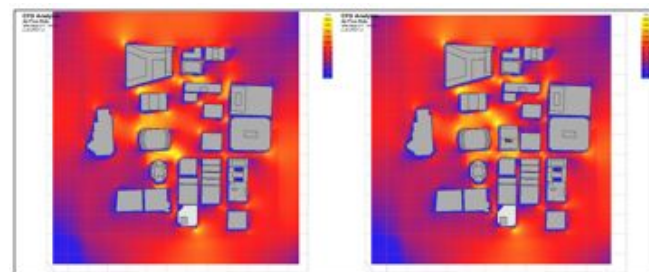
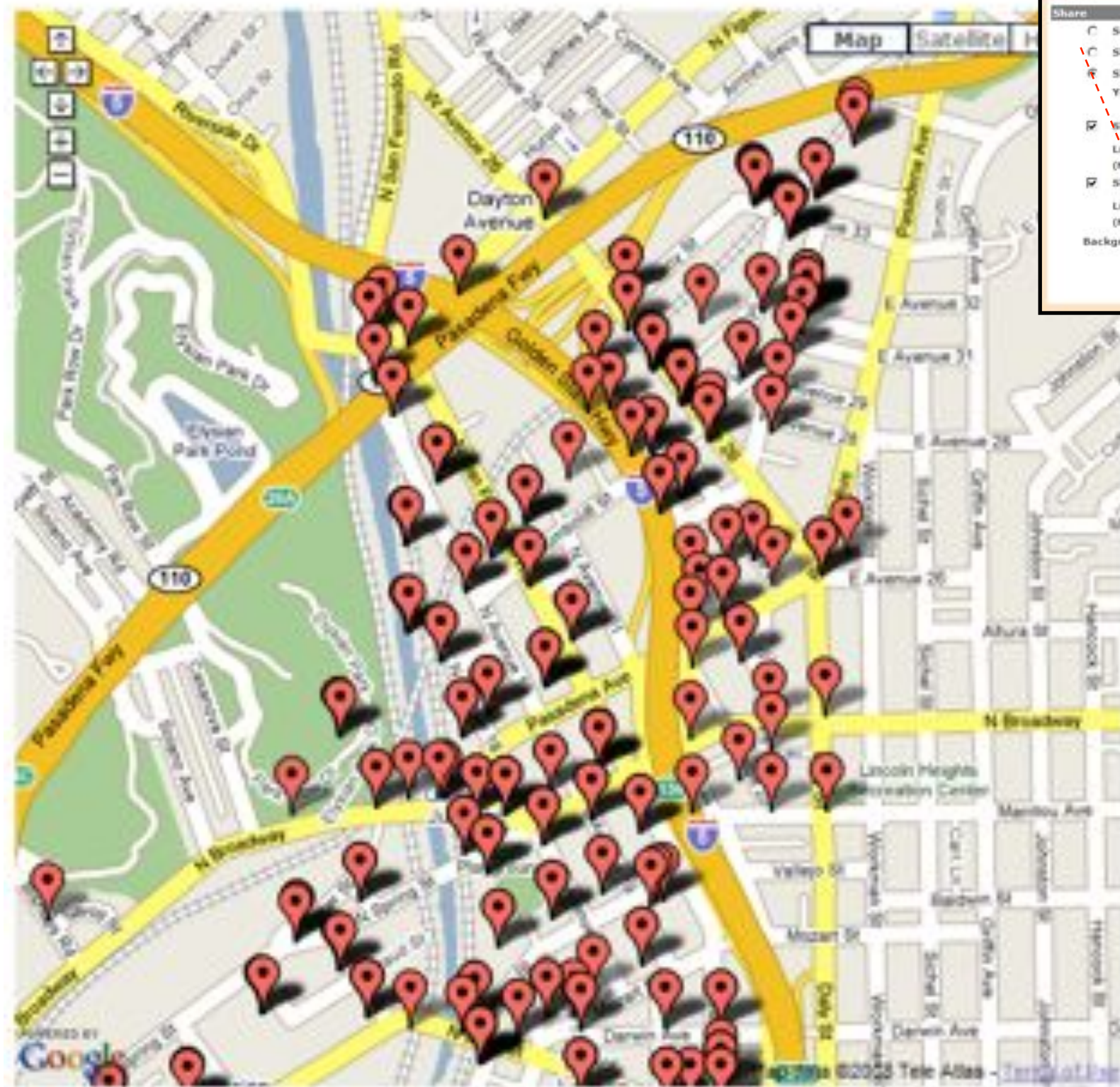


Figure 1 – 3D models showing the original site and the proposed addition



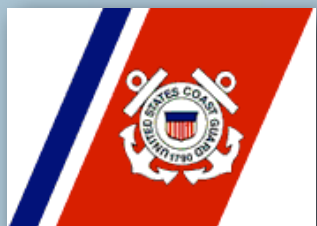
Develop a Wide Range of Project Information



The screenshot shows the 'Project List' window in OPS Studio. The 'Share' tab is active, displaying sharing options for the selected project. A red dashed line highlights the option 'Share as teamwork Scheme/Site to allow other users to edit', which is currently selected. Below this option, it indicates that 'Yong Ku Kim is editing the scheme' and provides an 'Unlock scheme' button. Other visible options include 'Share Scheme/Site with other users of this OPS Studio™' and 'Share in the ONUMA Web Services Catalog'. The window also shows a menu bar at the top with options like 'About', 'Home', 'Attachment', 'Projects / Schemes', 'Sites', 'Buildings/Plots', 'Spaces', 'Report/Print', 'Settings', 'Bug', and 'Help'. The status bar at the bottom indicates 'POWERED BY ONUMA™'.

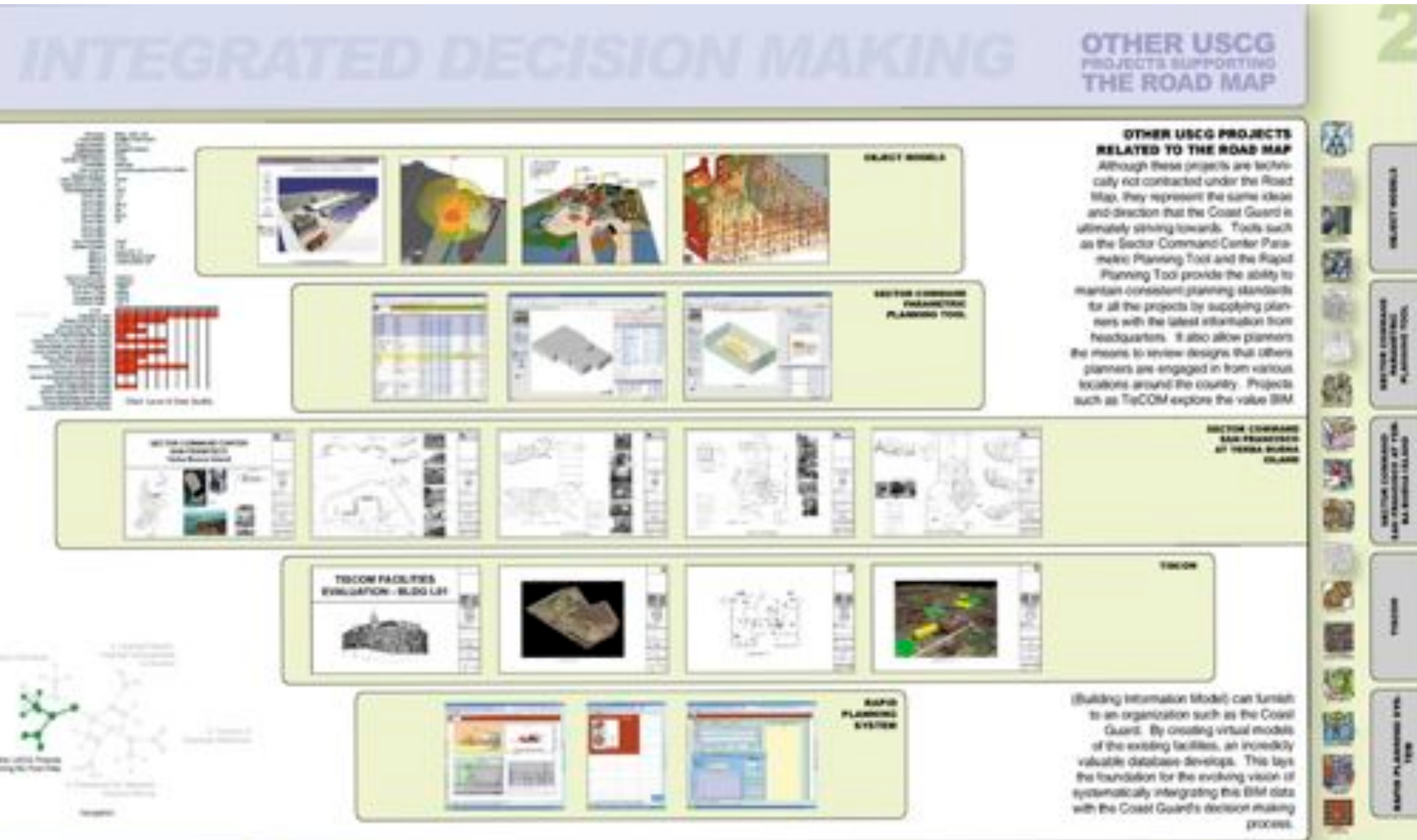
Teams were encouraged to share their projects online with the rest of the entire virtual team early in their design process.

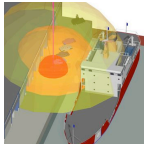
**BIMstorm Los Angeles used OPS,
a web-based BIM application.**



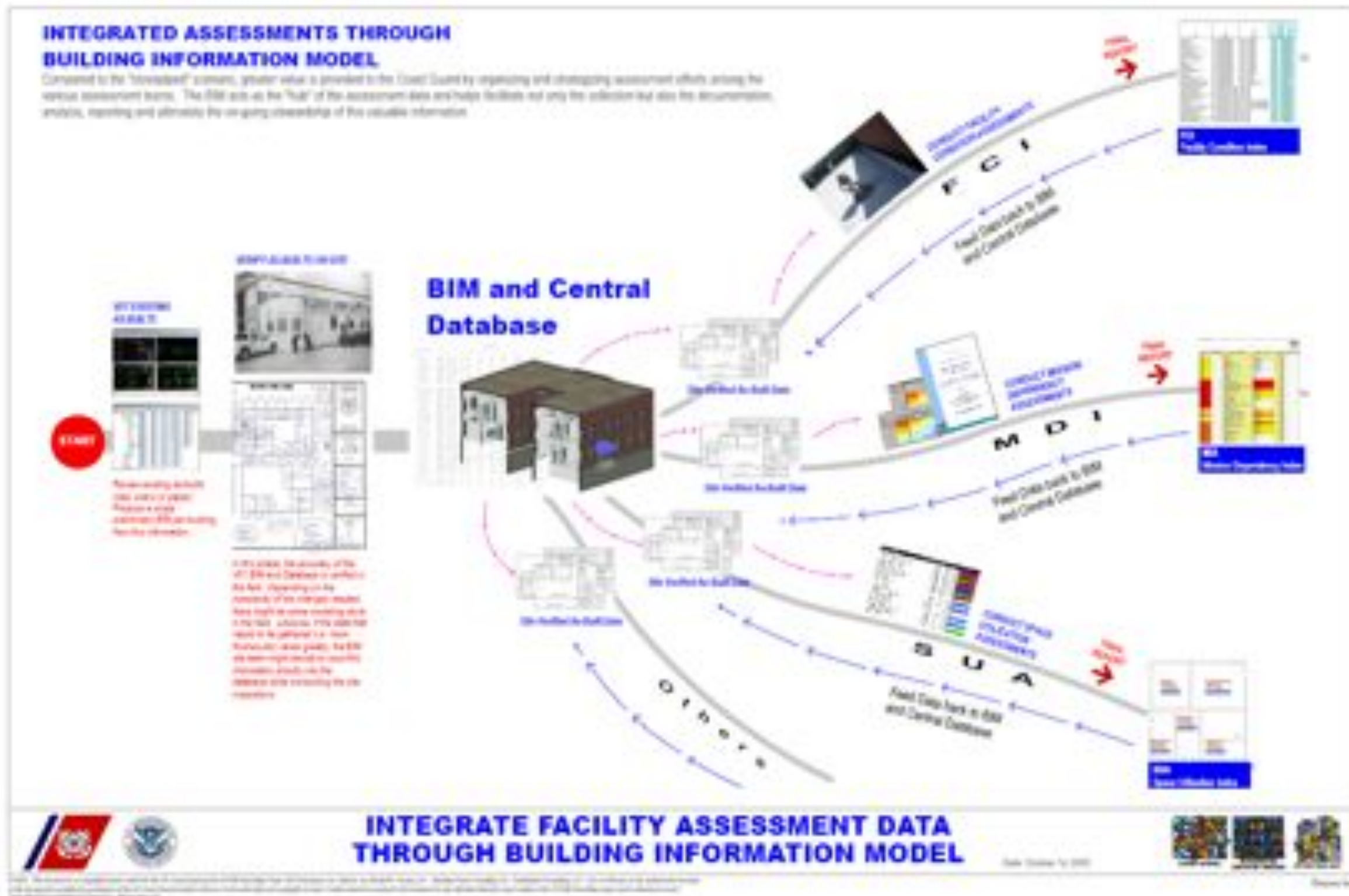
Case Study USCG

Enter Data Once - Use it Many Times





Sustainable Use of Data and Knowledge



Chair 06

Chair 06

Chair 06

Chair 06

Chair 06

Chair 06

Chair 06

Chair 06

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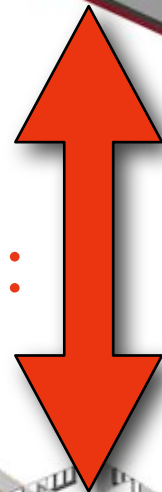
Chair 06

Chair 06

MISSIONS



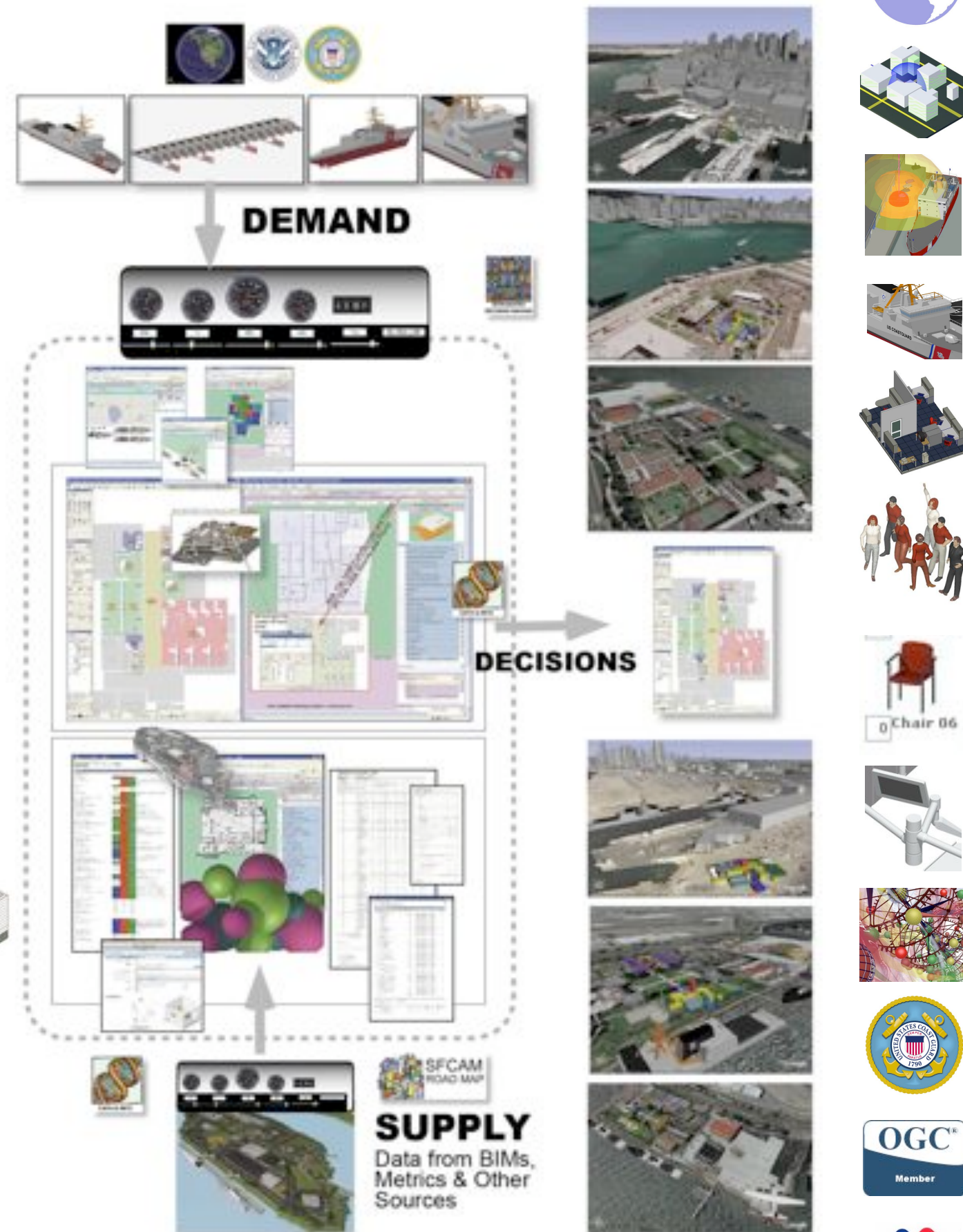
Connected to:



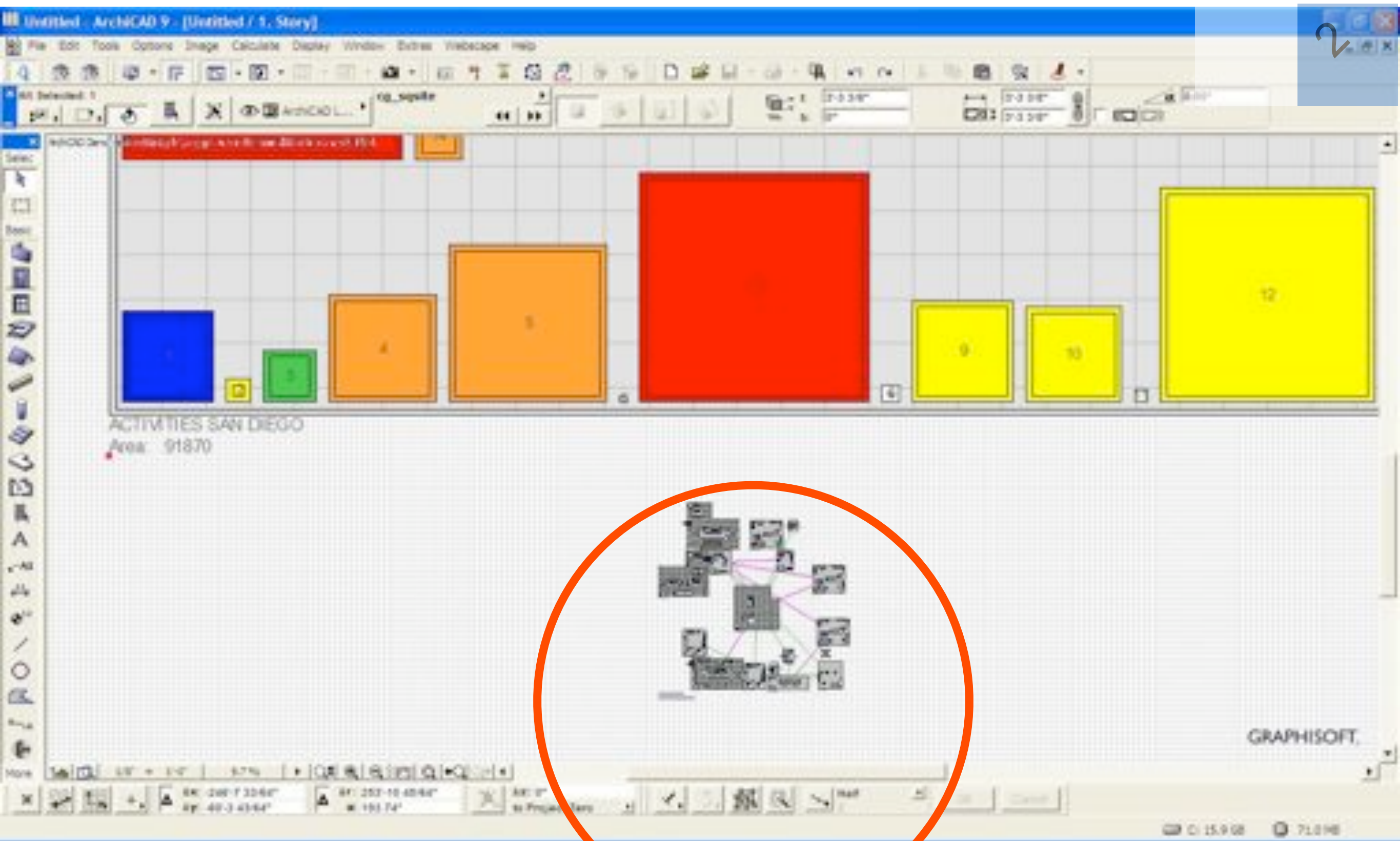
PORTFOLIO
Management

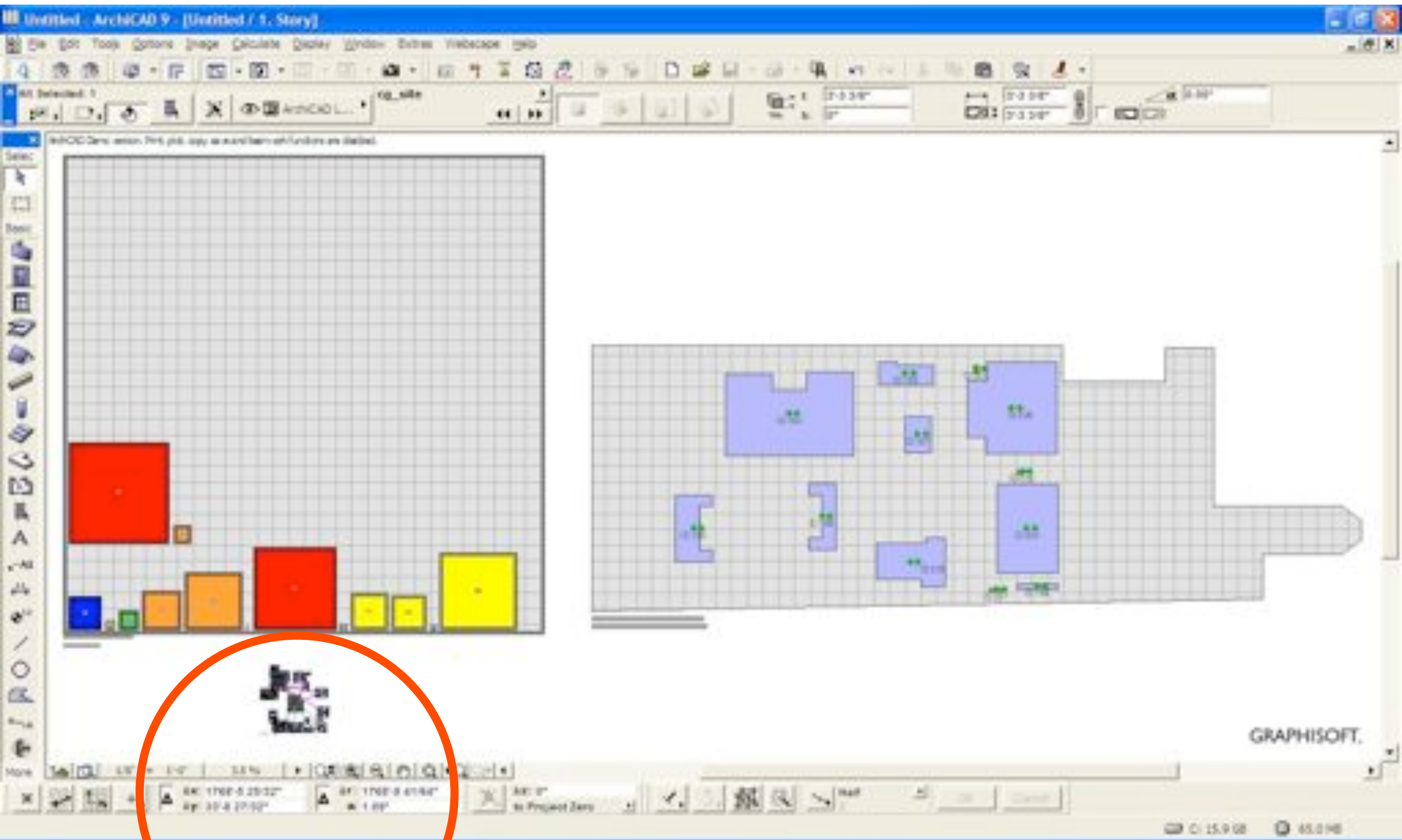


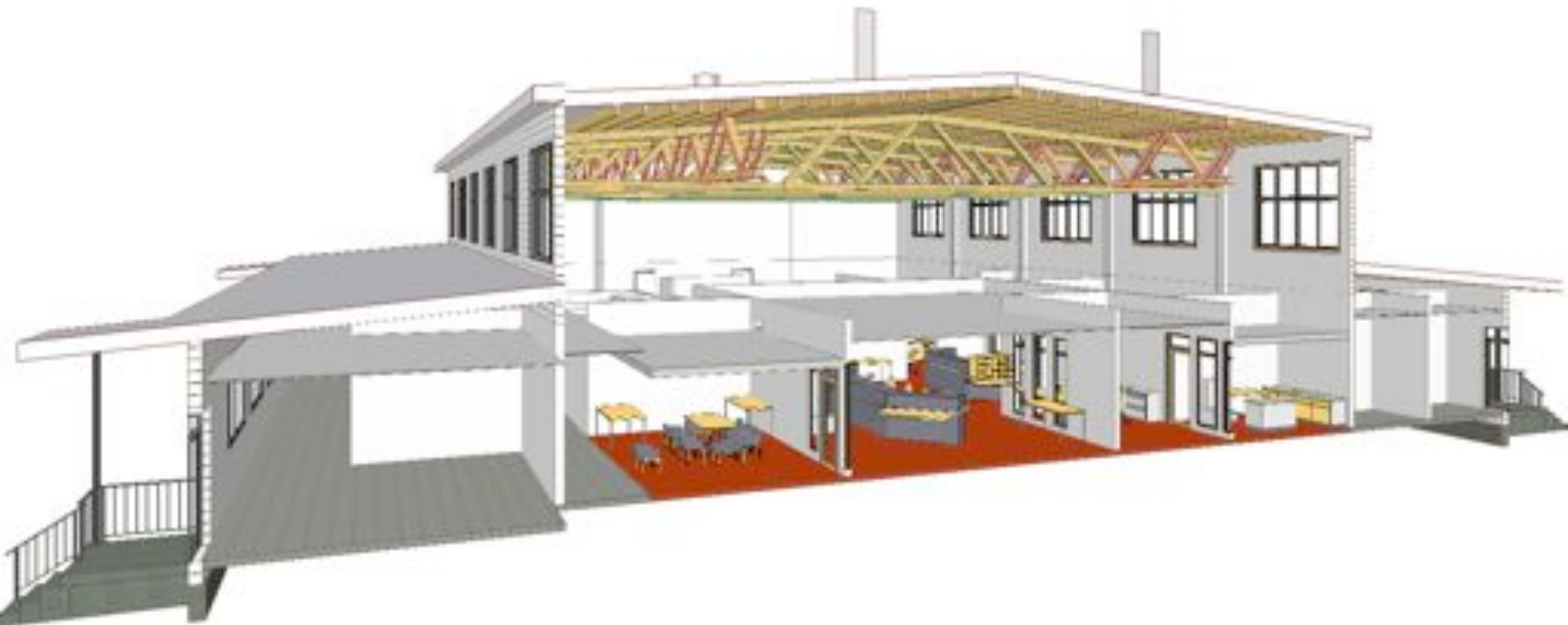
FACILITIES

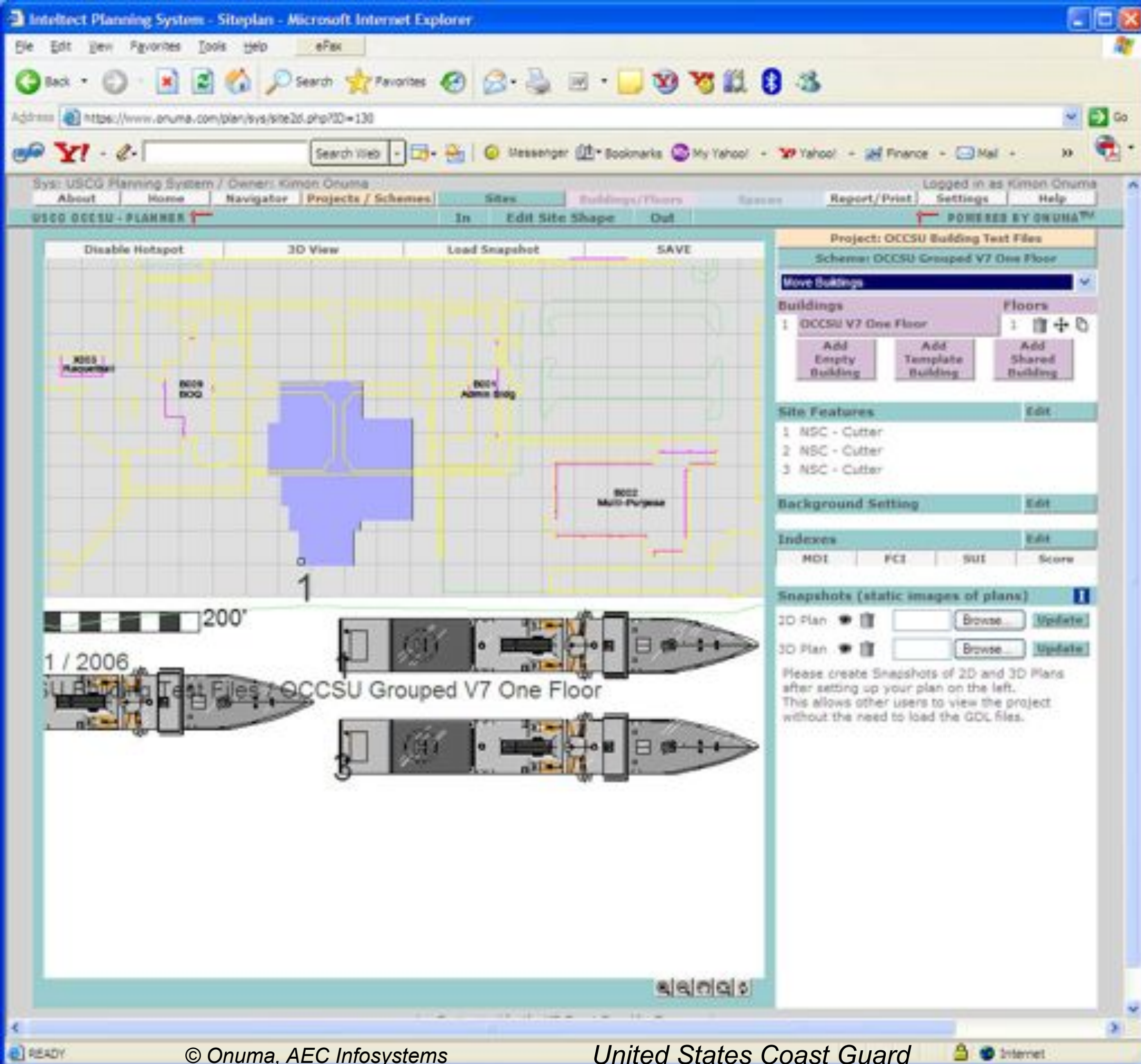


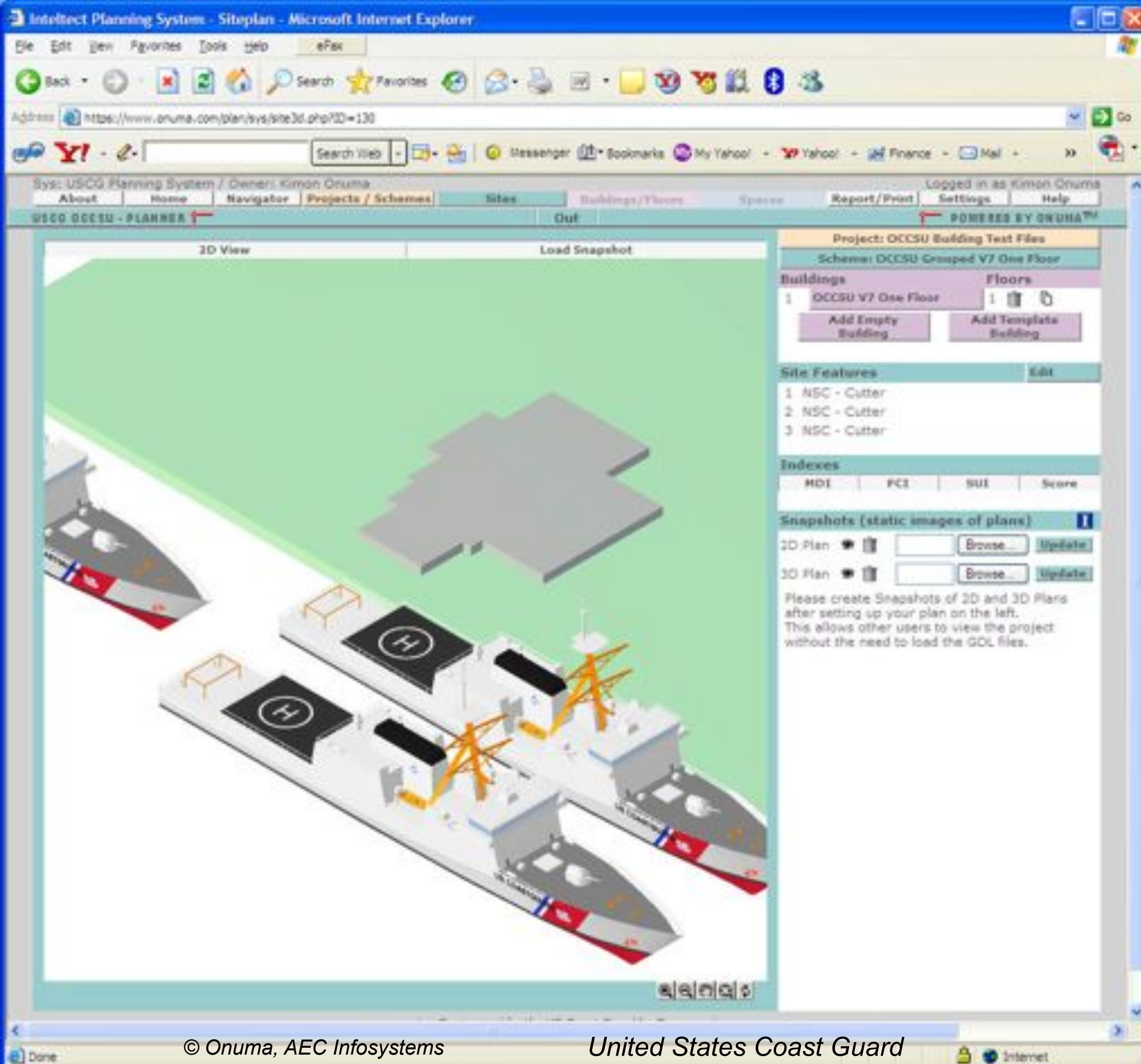














- Buildings
- 1 Bldg 1 Existing
 - 2 Bldg 2 Existing
 - 3 Building 1
-

- Site Features
- 1 Parking / Roadway
 - 2 NSC - Cutter
 - 3 NSC - Cutter
 - 4 NSC - Cutter
 - 5 NSC - Cutter
 - 6 Bomb
 - 7 Dimension Tool
 - 8 Bomb

Indexes

Snapshots (static images)

2D Plan ☒ ☐

3D Plan ☒ ☐

Please create snapshots of your plan after setting up your plan on the map. This allows other users to view the plan without the need to load the plan.



Project: Massachusetts Institute of Technology

Subarea: MIT Site 1

Buildings	Height
1 Administration	7
2 Butler	3
3 Beckman Auditorium	3
4 Beckman Behavioral Biology	3
5 Beckman Institute	4
6 Brown	3
7 Bridge Avenue	4
8 Carpenter, Synchrotron	5

Site Features

Export





**Office****General Space Info**

- Space Number: 04
- Space Area: 118 W
- Capacity: 2
- Occupancy: 2
- Space Height: 25.00000
- Space Elevation: 0.00000

Wind Speed Info

- WSD: 40.00
- WS: 1.00
- PD: 0.50

UICC Space Info

- Space Code
- UICC Land Code
- UICC Site Number
- UICC Group Code

CSA Space Area

- CSA Area: 118 W

CSA/STAR Space Categories

- CSA/STAR Space Type: 000
- CSA/STAR Space Category: 00
- APOL/STAR Space Category: 00

CSA/STAR Space Zones

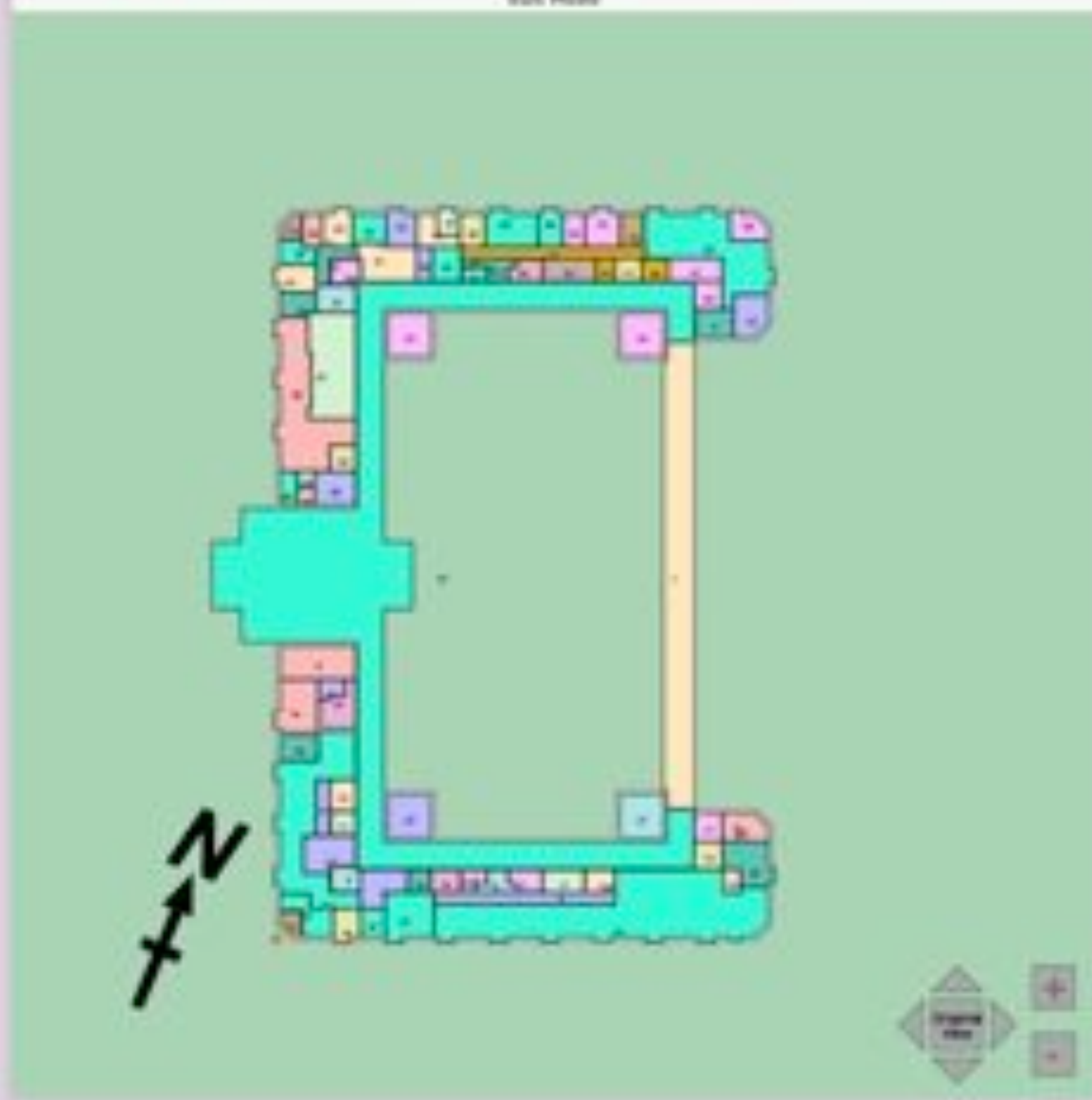
- Security Zone: Restricted
- Information Zone: Restricted
- Privacy Zone: Public
- Project Specific Zone

CSA Space Properties

- Occupant Organization Code: 0000
- Occupant Organization Abbreviation: 000
- Occupant Organization Name: Public Buildings Service - 000
- Occupant Sub-Organization Code
- Occupant Building ID: 000000000

Administration

Site Plan



Project: Massachusetts Institute of Technology

Scheme: MIT Site 5

Administration - Floor 1

- Floors
- Floor 1
- Floor 4
- Floor 5
- Floor 6
- Floor 7
- Floor 8
- Floor 9
- Floor 1

Normal View ⌵

Spaces

Colour Mapping

Detailed Filter
Detailed Filter

Display Colors:

Departments

Reset

Department Settings	
Department Name	Color
Dept 1	<div style="width: 20px; height: 15px; background-color: #add8e6; border: 1px solid black;"></div>
Dept 2	<div style="width: 20px; height: 15px; background-color: #ff69b4; border: 1px solid black;"></div>
Dept 3	<div style="width: 20px; height: 15px; background-color: #ffff00; border: 1px solid black;"></div>
Dept 4	<div style="width: 20px; height: 15px; background-color: #f08080; border: 1px solid black;"></div>
Dept 5	<div style="width: 20px; height: 15px; background-color: #9370db; border: 1px solid black;"></div>
Dept 6	<div style="width: 20px; height: 15px; background-color: #90ee90; border: 1px solid black;"></div>
Dept 7	<div style="width: 20px; height: 15px; background-color: #ffcc99; border: 1px solid black;"></div>
Dept 8	<div style="width: 20px; height: 15px; background-color: #00ced1; border: 1px solid black;"></div>
Dept 9	<div style="width: 20px; height: 15px; background-color: #20b2aa; border: 1px solid black;"></div>
Dept 10	<div style="width: 20px; height: 15px; background-color: #ffb6c1; border: 1px solid black;"></div>
Dept 11	<div style="width: 20px; height: 15px; background-color: #d2b48c; border: 1px solid black;"></div>
Dept 12	<div style="width: 20px; height: 15px; background-color: #8b4513; border: 1px solid black;"></div>
Dept 13	<div style="width: 20px; height: 15px; background-color: #ff8c00; border: 1px solid black;"></div>
Dept 14	<div style="width: 20px; height: 15px; background-color: #ff0000; border: 1px solid black;"></div>
Dept 15	<div style="width: 20px; height: 15px; background-color: #ff00ff; border: 1px solid black;"></div>

Space Relationships

EDIT MODE



Project: Massachusetts Institute of Technology

Scheme: MIT Bldg 5

Administration - Floor 4

Floors

Floor 7

Floor 6

Floor 5

Floor 4

Floor 3

Floor 2

Floor 1

Floor 0

Normal view

Spaces

Color Setting

Default Filter

Detailed Filter

Display Colors

Security Zone

Reset

Color Key

OSHA Security Zone

Public

Restricted

Secure

Green

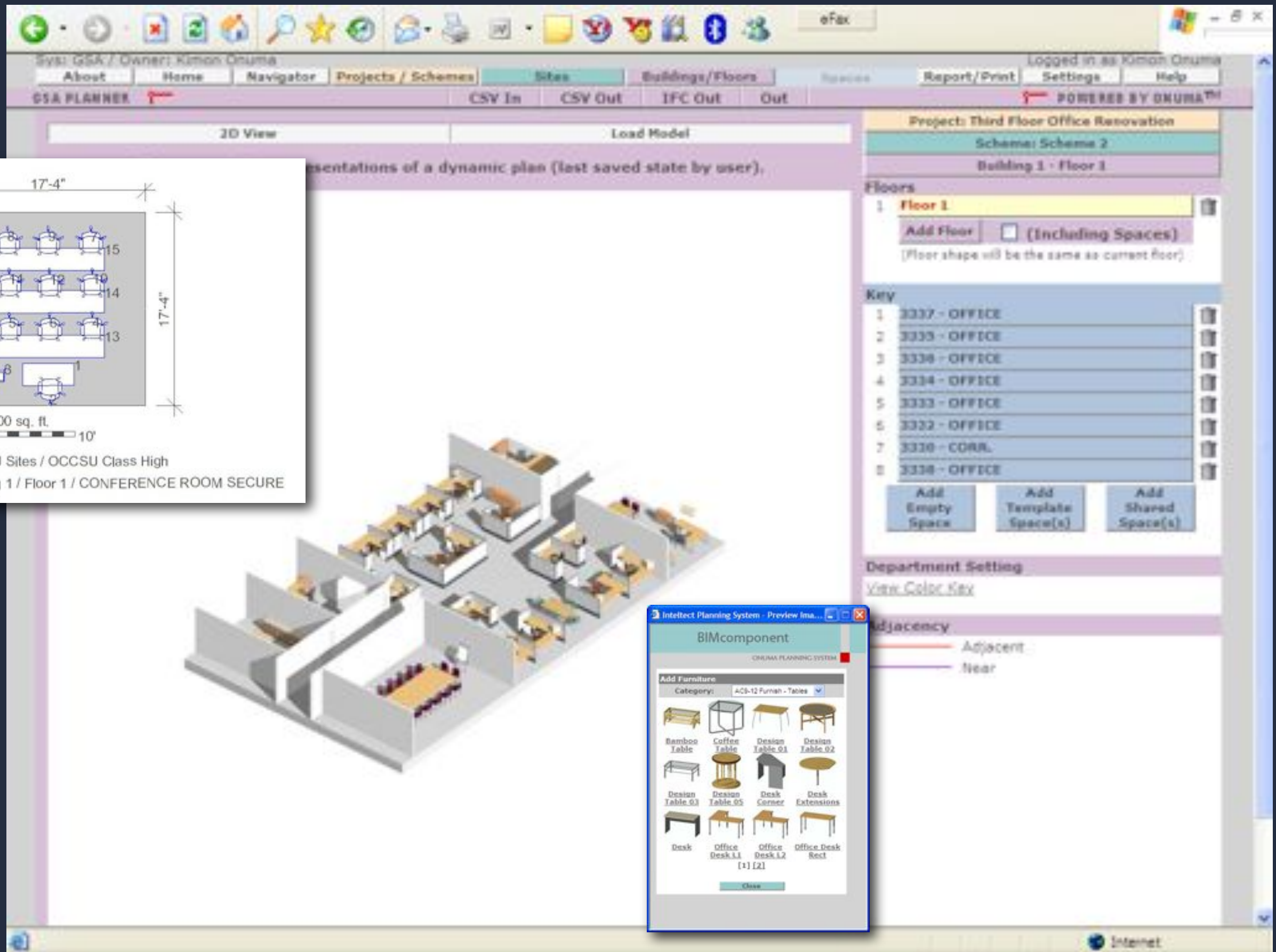
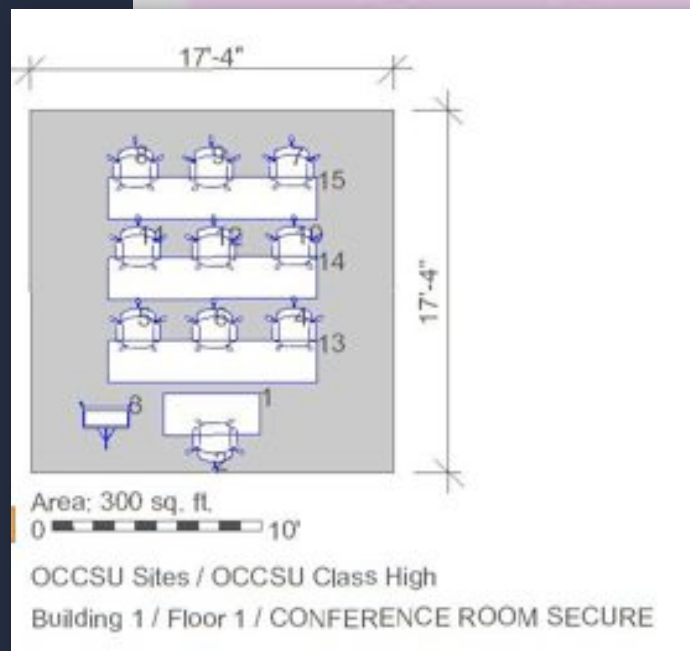
Yellow

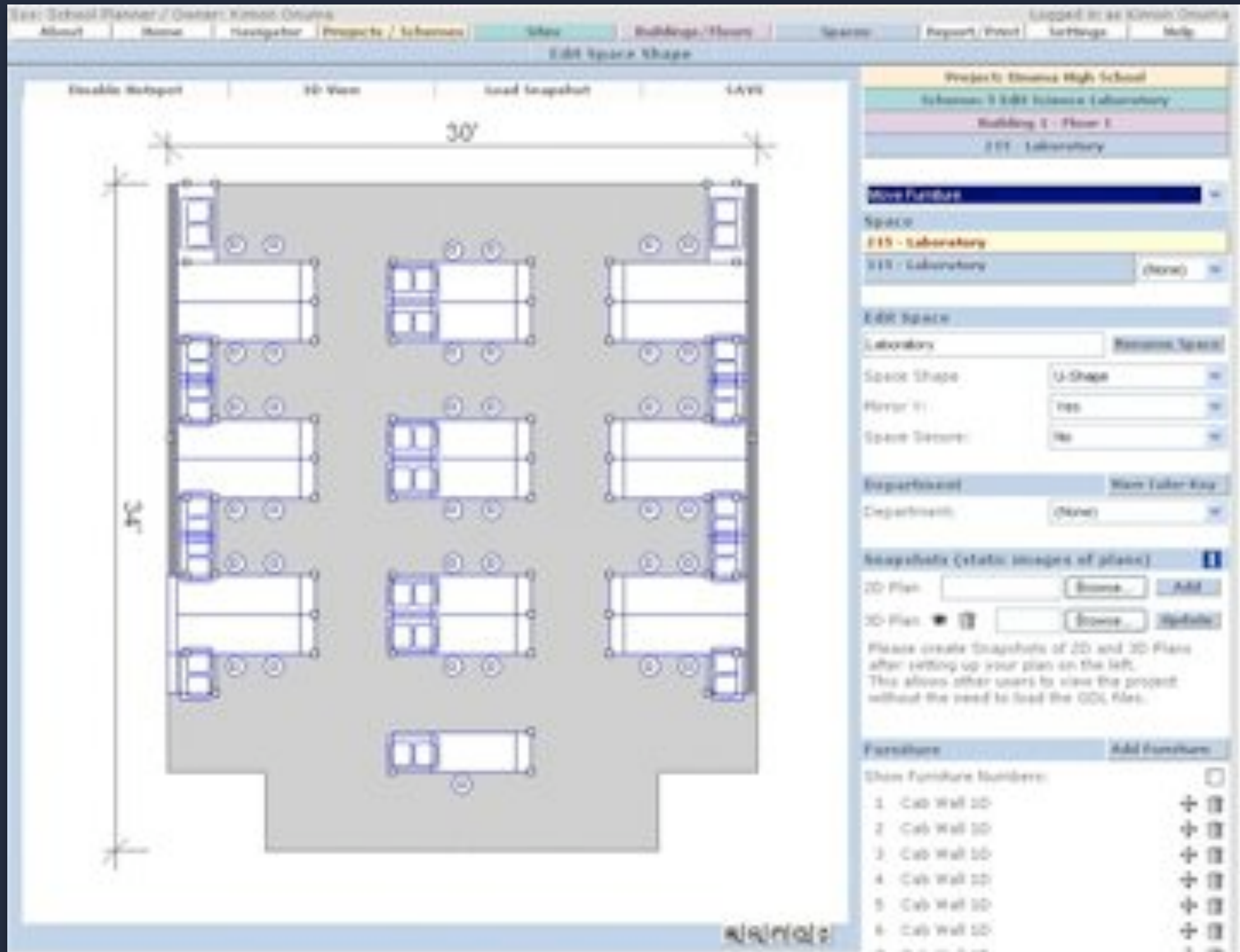
Red

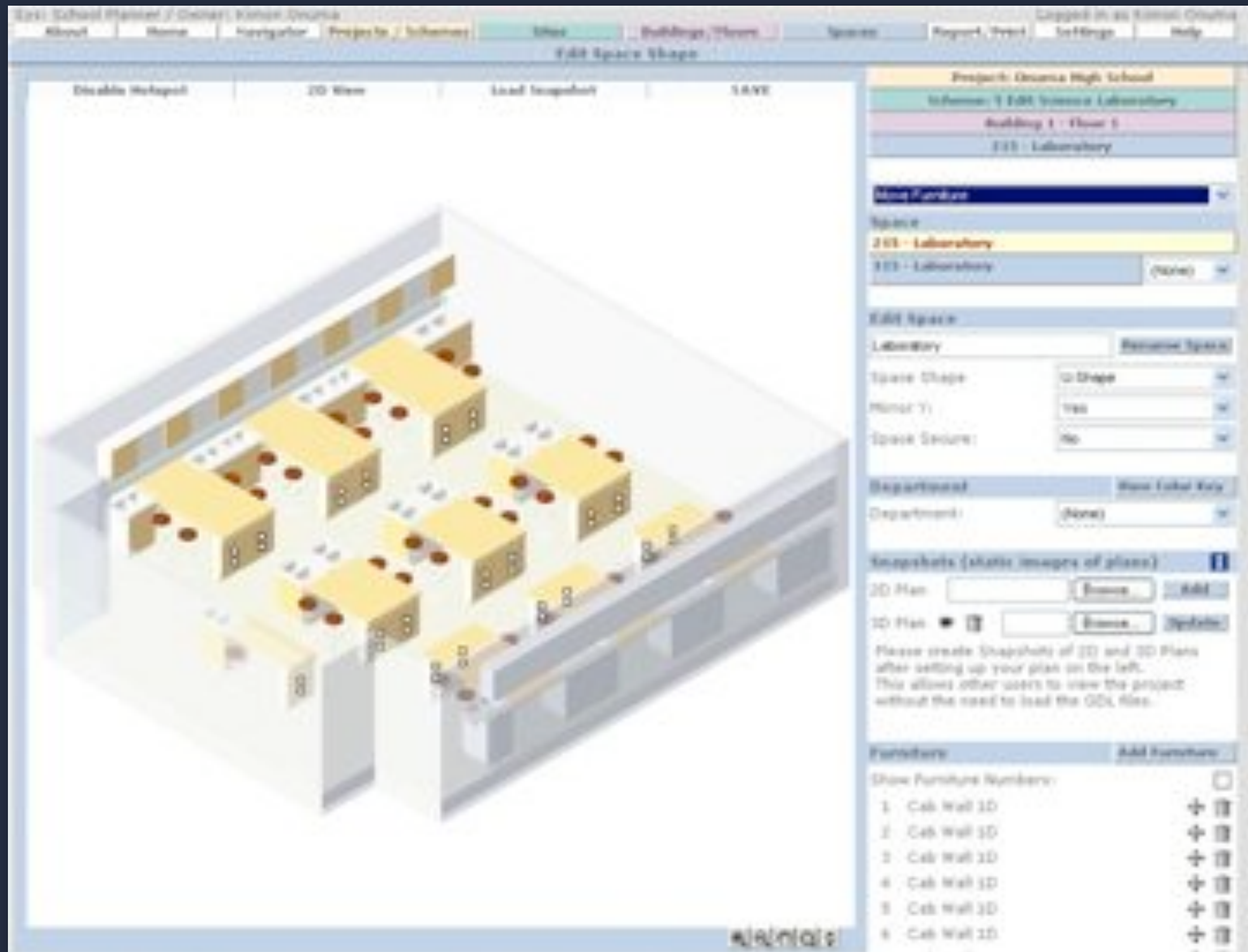
Space Relationships

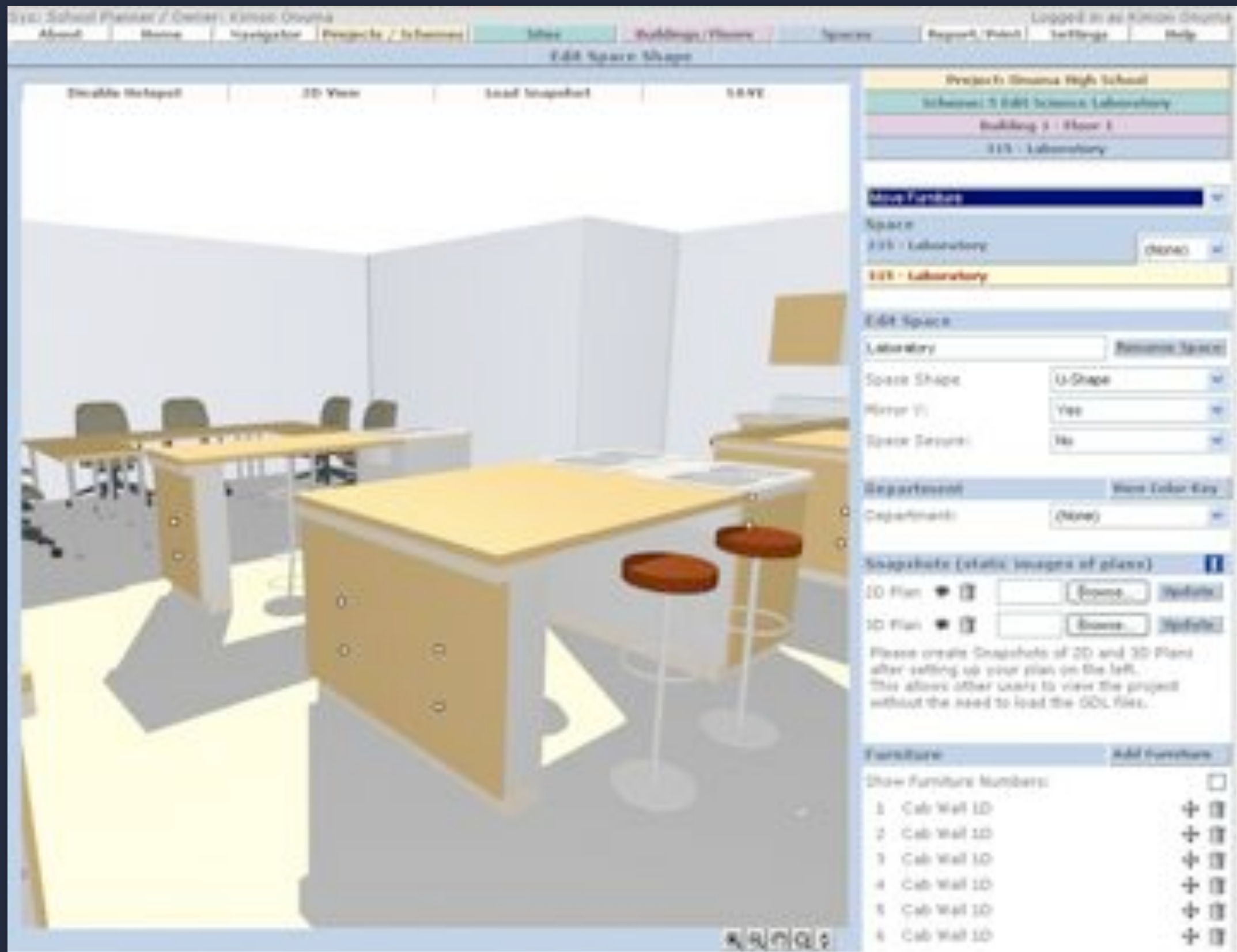
Export











BIM for Life-Cycle Planning and Design



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