

Broadening the Perspective of Technology in Architectural Practice

October 19, 2012 | Stanford, CA
Stanford University Center for Integrated Facility Engineering

Advancing the Value of Technology in Architecture

John Roach

Executive Director, Technology Services
Foundation for California Community
Colleges

Rob Barthleman, AIA

Principal
ARCHITECTURE/vbn



Broadening the Perspective of Technology in Architectural Practice is registered with AIA CES.

Online + Components: **TAP101912W**

Stanford CIFE Live Event: **TAP101912S**

Questions? Contact tap@aia.org

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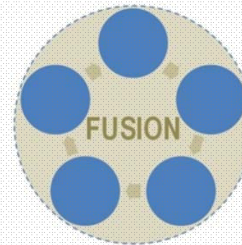
Principal
ARCHITECTURE/vbn



California's Community Colleges

The largest system of public higher education in the world

- 72 Districts
- 112 Colleges
- 300 Sites
- 24,000 acres
- 5,000 Buildings
- 71 Million Square Feet
- 2.75 Million Students



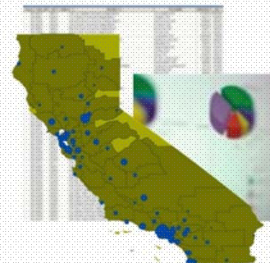
On-site Building Assessments



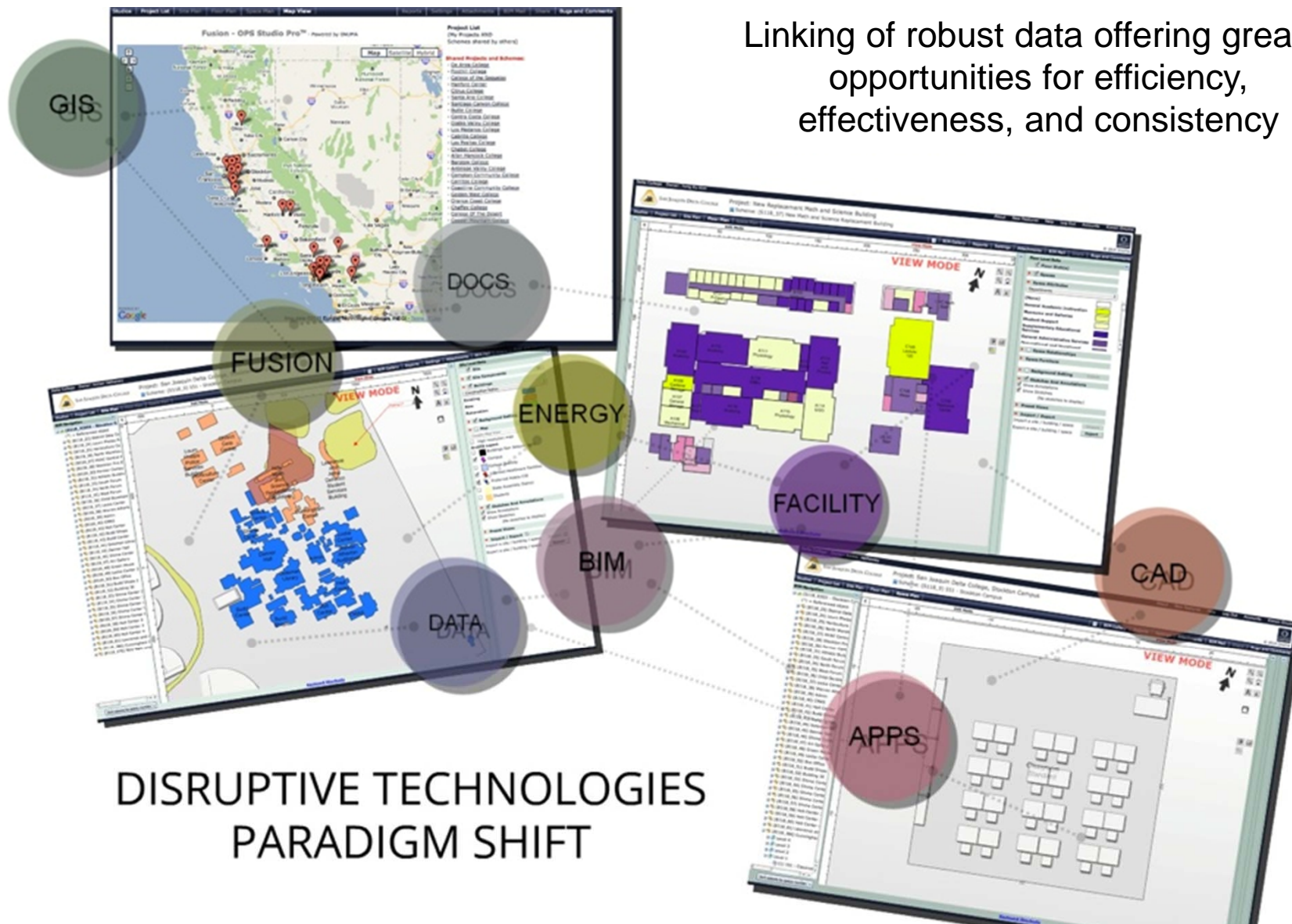
Web portal



Classroom training



Architectural drawings database



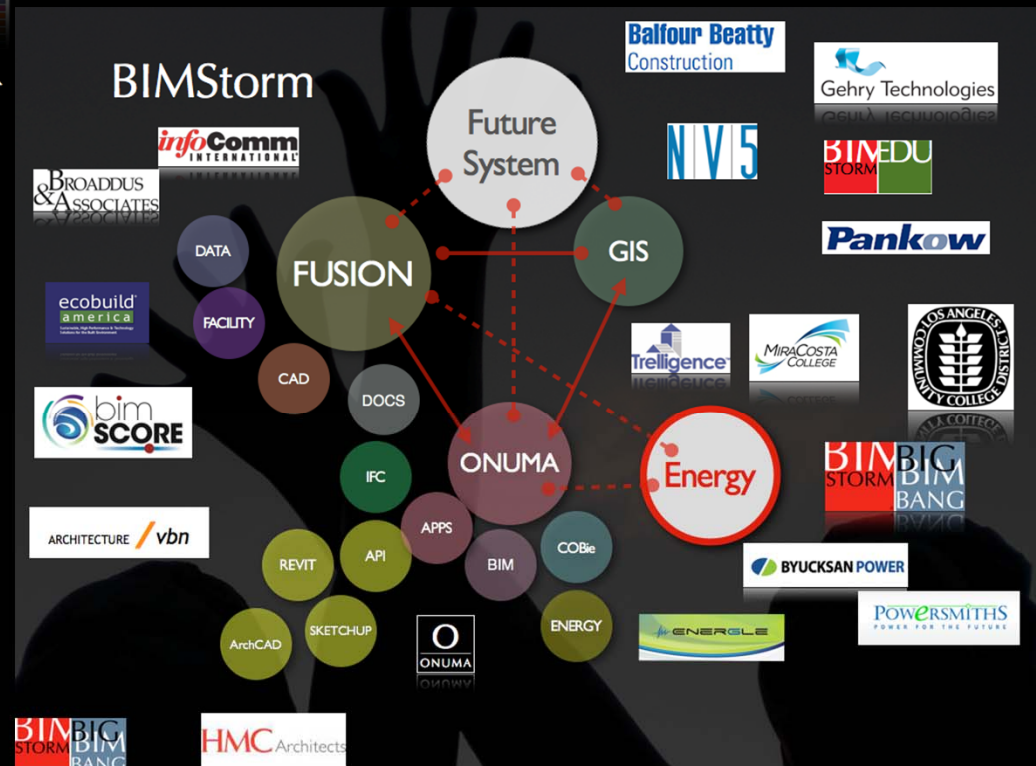


CLOUD BIM SERVER

Linking intra-system data
with developing technologies
and systems to expand
value of data

Seeking linkage to energy
systems and utilities

Architects, Engineers,
Builders, and Facilities
Management



1. Log In

2. Studios

3. Projects

4. Site

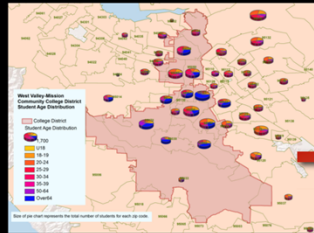
5. Building

6. Room



Levels of Specificity

1. Define Project

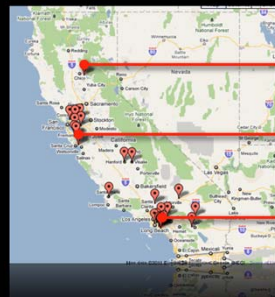


Demographic Data from GIS



Defines District Need

2. Planning Proposals



From FUSION+GIS+ONUMA

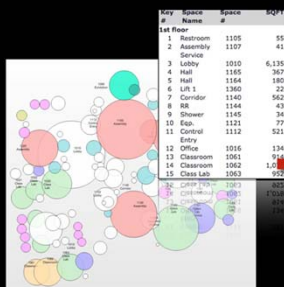
Project 1

Project 2

Project 3

District Projects as
Excel and BIM from ONUMA

3. Design



District Planning
Proposal Data



Design Team Works in
BIM or CAD

4. Submit Back to District

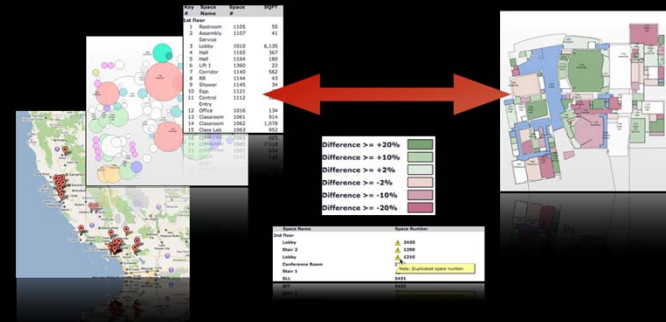


Design Back in
FUSION GIS ONUM

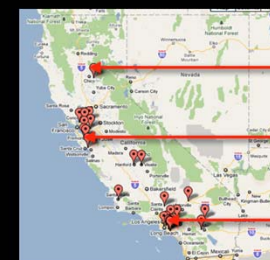


Design Submitted Back
to District

5. District Review



6. As Built



FUSION+GIS+ONUMA
gets more refined with
each project

Project 1

Project 2

Project 3

Completed Project data from
Contractors Delivered
back as

California Community Colleges' FUSION Database

The screenshot displays the FUSION Database interface. The top navigation bar includes links for Home, Assessment, Space Inventory, Planning, Project, and Manual. The left sidebar shows a tree view of the Space Inventory, with the Science Center (12) selected. The main content area displays the Science Center Building Profile and a list of rooms.

Building Profile

Building No.:	12	Year Built:	1971
Name:	SCIENCE CENTER	Last Addition:	
Abbrev:	SC KTD	Building Status:	A
Plan Type:	Permanent	Total Outside Gross Sq Ft:	51,236
Location Code:	College/Campus	Total Rooms:	104
Ownership Code:	Owned in fee simple	Total Assign Stations:	863
Condition Code:	3 - Remodeling - B	Total Assignable Sq Ft:	35,198
Construction Code:	Fire resistive - Concrete		
Efficiency:	68.70%		

Rooms

Prfx.	Rm No.	Sufix.	Room Use#	Room Use	Top/CSS #	Top/CSS Description	Assgn. Station	Assgn. Sq. Ft.	Dept No.	Program Code	Status
SC	41		715	DP/Computer Service	0701	Information Technology, General	0	177		Computing Support	A
SC	75		215	Class Lab Service	1900	Physical Sciences	1	96		General Academic Instruction	A
SC	76		210	Class Lab	1701	Mathematics, General	7	158		General Academic Instruction	A
SC	80	LS	215	Class Lab Service	0401	Biology, General	1	375	04	General Academic Instruction	A
SC	81	LS	215	Class Lab Service	0401	Biology, General	0	275	04	General Academic Instruction	A
SC	82	LS	215	Class Lab Service	0401	Biology, General	0	138	04	General Academic Instruction	A
SC	83	LS	215	Class Lab Service	0401	Biology, General	0	173	04	General Academic Instruction	A
SC	84	LS	215	Class Lab Service	0401	Biology, General	0	210	04	General Academic Instruction	A
SC	85	CH	215	Class Lab Service	1905	Chemistry, General	0	227	32	General Academic Instruction	A
SC	86	CH	215	Class Lab Service	1905	Chemistry, General	0	617	32	General Academic Instruction	A
SC	87	CH	215	Class Lab Service	1905	Chemistry, General	0	380	32	General Academic Instruction	A
SC	88	CH	215	Class Lab Service	1905	Chemistry, General	0	140	32	General Academic Instruction	A
SC	89	CH	215	Class Lab Service	1905	Chemistry, General	0	161	32	General Academic Instruction	A

Robust data, but difficult to navigate, sort, and visually assess

Fusion - Owner: Thomas Dellbert

Project: 0560 - Sequoias
Scheme: (S130_67) College of the Sequoias

Studios | Project List | Site Plan | Floor Plan | Space Plan | Edit Mode | View Mode

BIM Navigation

(S130_67) College of the S

Reference Objects

- (B130_5582) CEDAR (IND)
- (B130_5583) BUCKEYE (IN
- (B130_5584) GENERAL GR
- (B130_5585) BLUE OAK (F)
- (B130_5586) ALTA PEAK (C
- (B130_5587) LODGEPOLE (
- (B130_5588) POTWISHA (I
- (B130_5589) KAWEAH (FD
- (B130_5590) TULE (C.F.S.)
- (B130_5591) MORO (GYM)
- (B130_5592) SAN JOAQUIN
- (B130_5593) MARIPOSA (F
- (B130_5594) DOGWOOD (C
- (B130_5595) GIANT FOREST
- (B130_5596) HOSPITAL RC
- (B130_5597)
- (B130_5598)
- (B130_5599) JOHN MUR
- (B130_5600) KERN (BUS/FO
- (B130_5601) MANZANITA (C
- (B130_5602) UTILITY PLAN
- (B130_5603) CSUF Admin
- (B130_5604) LIVE OAK (CH
- (B130_5605) CENTRAL PL
- (B130_5606) MONACHE (M
- (B130_5607) VALLEY OAK
- (B130_5608) VALLEY OAK
- (B130_5609) YOKUT (PORT
- (B130_5610) CSUF Center
- (B130_5611) PONDEROSA
- (B130_5612) SAWTOOTH (C
- (B130_5613) SIERRA (MUS
- (B130_5614) WOLVERTON
- (B130_5615) SEQUOIA (AZ
- (B130_5616) BUNKER (ADI
- (B130_5617) COFFEE HOU
- (B130_5618) SYCAMORE (C
- (B130_5766) POOL STORA
- (B130_5767) BASEBALL CC
- (B130_5768) BASEBALL S1
- (B130_5769) FOOD COURT
- (B130_5770) HANFORD CE
- (B130_5771) CSUF Center
- (B130_5772) BASEBALL CC
- (B130_5773) HANFORD VC
- (B130_5774) FOOTBALL S1
- (B130_5775) GREENHOUSE
- (B130_5776) HANFORD CC
- (B130_5777) HANFORD CC
- (B130_5778) CSUF RESTRI
- (B130_5779) HANFORD PC

Live Fusion Data Repair Replacement FCI Deficiencies

Buildings and data down to individual rooms linked to Fusion via Web Services 120,000 Rooms for Entire State

Live Link from Fusion Document System

Building Settings: (B130_5600) KERN (BUS/FOG LANG.)

General Attributes Elevation Fusion

Repair: \$10,086,914.29

Replacement: \$15,592,500.78

FCI: 64.6900

Deficiencies

Locked

Unlocked

Selected buildings: 19: KERN (BUS/FOG LANG.)

Save Cancel Settings

Add Object(s)

Add AutoBIM

Duplicate Building

Empty Buildings

Live FCI from Fusion

Custom Shape

1 Floor(s)

Rectangle

1 Floor(s)

L-shape

1 Floor(s)

C-shape

1 Floor(s)

Prop Line

Building Footprint

Live GIS Data from CCC

Building in BIM in ONUMA System

Site Level Data

Site

Site Components

Buildings

Building FCI

Selection

<10

<50

<90

>90

Background Setting

Unlock

Map

Google Satellite Image View

High resolution map

ArcGIS Layers

Buildings Citrus

Buildings DeAnza

Buildings Foothill

Buildings San Jacinto Delta

Buildings Santa Ana

Buildings Santiago Canyon

Buildings Sequoias

Buildings Sequoias Hanford

Campus Sites

Licensed Healthcare Facilities

Preferred Hotels CID

Sketch a polygon to get the features on a GIS layer:

Sketch

Sketches And Annotations

Preset Views

Import / Export

Exporter

Export

Site Exporter: (B130_87) College of the Sequoias

Building Exporter: (B130_5582) CEDAR (INDUST Bldg)

Export Buildings for use in other Applications

Export to Google Earth

Export to IFC

Export to KML

Export to Revit

Export to AutoCAD

Export to GIS

Export to SketchUp

Export to COBIE

Export Building Data to Spreadsheet

Most of these exported spreadsheets can be used to update building data by re-importing them.

Export Space Relationships (COBIE)

Export Space Attributes (COBIE)

Export IFC Attributes

Update Partitions, Rooms, and Equipment Attributes including the building component "Types" with "Attributes" and the building "Systems" (space building components by System).

Export Type Attributes

Export "Types" of building components (rooms, equipment, furniture, etc.) to update and add additional Types.

Export Coordinates (Geo)

Export BIM File Data (Geo: Onuma+Broadbent)

Export of Building Data in multiple files based on the ONUMA BIM File Data Templates. These files can be re-imported to update most of the data required to produce a COBIE file for construction CDE systems.

Export Building Settings

Export Space Relationships

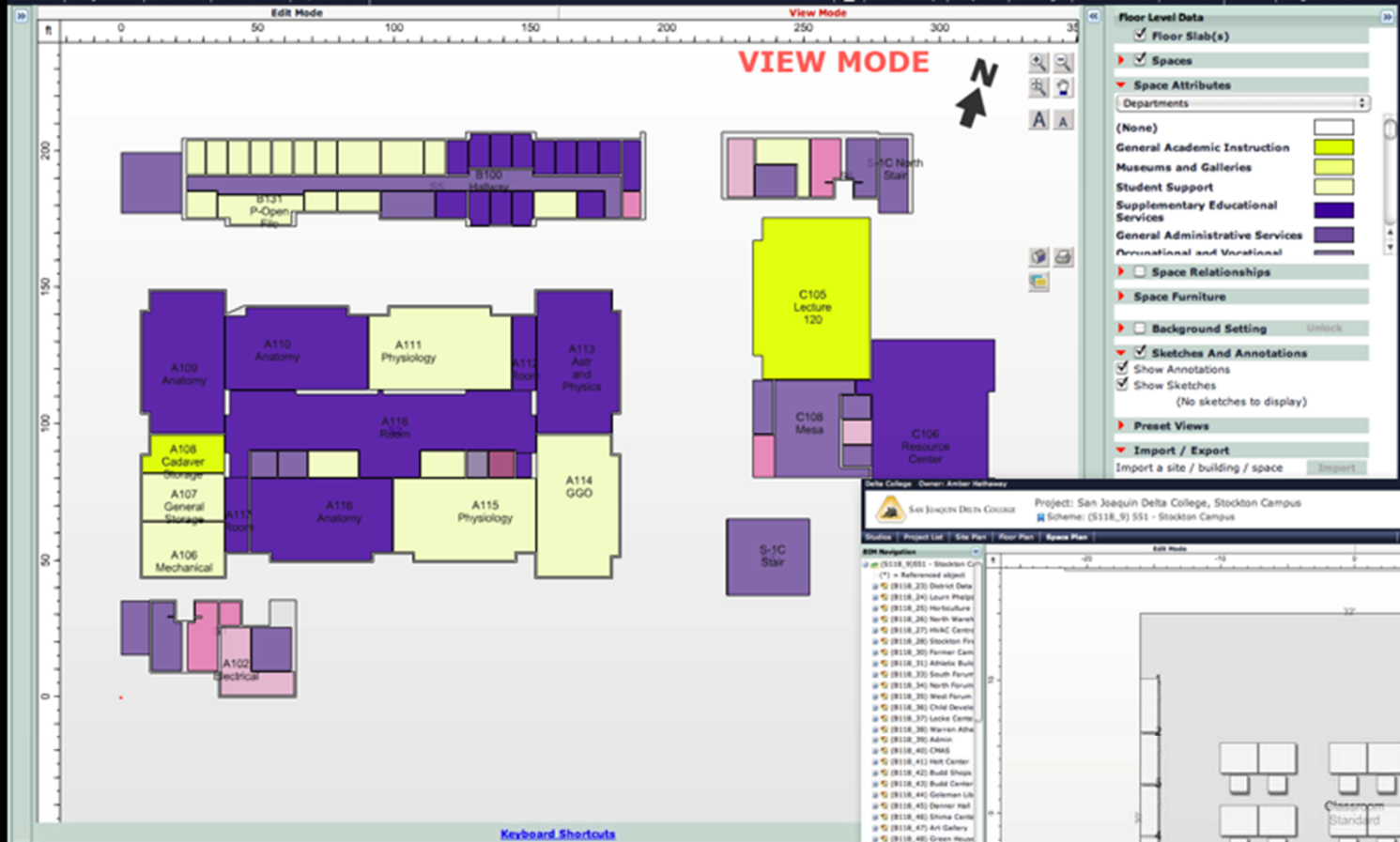
Space Relationships are expressed in a Matrix. Additional relationships can be added to the matrix and re-imported.

Export GPS Data

I'm not sure what this exporter was used for - it's hidden for the public now.

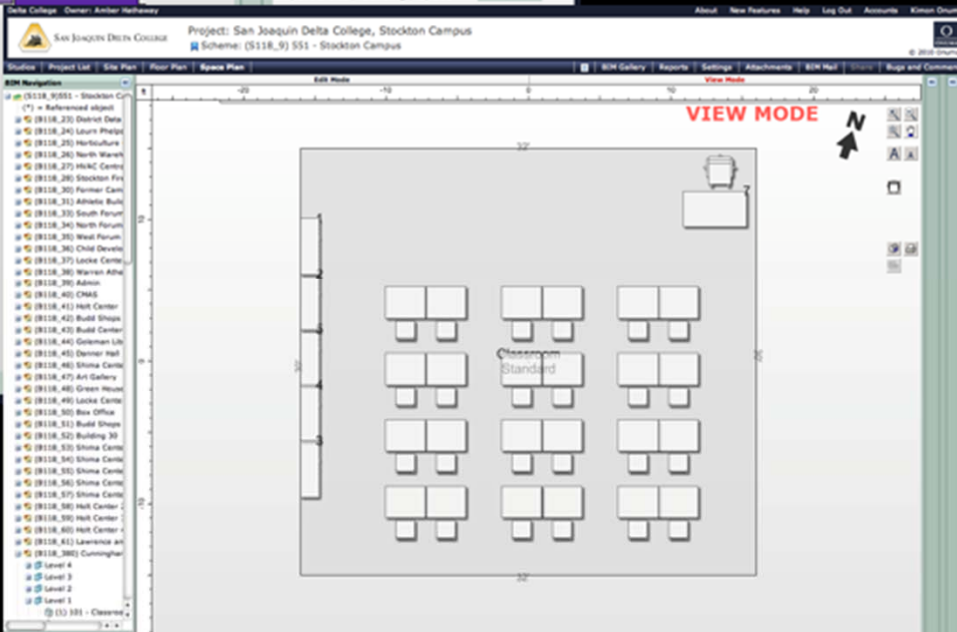
Building Exporter: (B130_5582) BUCKEYE (INDUST Bldg)

CLOUD COMPUTING
MASH-UP



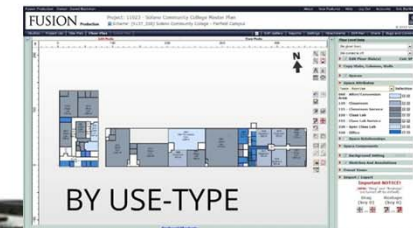
Floor Level Data

- ☒ Floor Slab(s)
- ☒ Spaces
- Space Attributes**
 - Departments
 - (None)
 - General Academic Instruction
 - Museums and Galleries
 - Student Support
 - Supplementary Educational Services
 - General Administrative Services
 - Recreational and Unofficial
- ☐ Space Relationships
- Space Furniture**
 - ☐ Background Setting
 - ☒ Sketches And Annotations
 - ☒ Show Annotations
 - ☒ Show Sketches
 - (No sketches to display)
- Preset Views**
 - ☐ Import / Export
 - Import a site / building / space



Programmatic Analysis and Alignment with Facilities

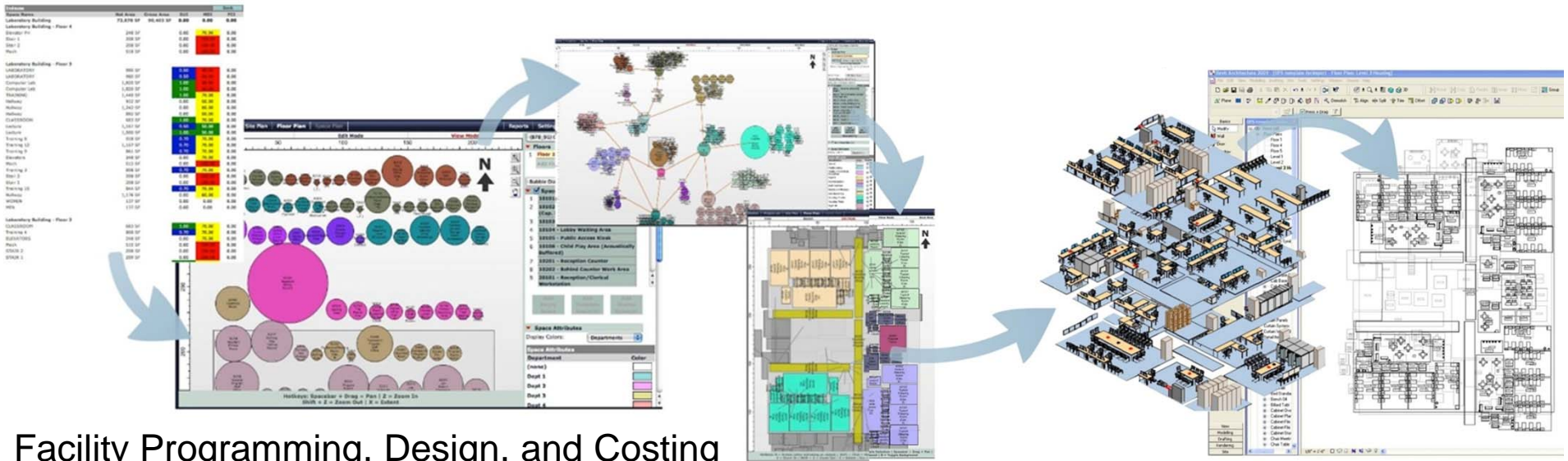
EDUCATIONAL MASTER PLAN
CAPITAL PLAN (master plan)
FACILITY ASSESSMENT
FUNDING SUBMITTALS



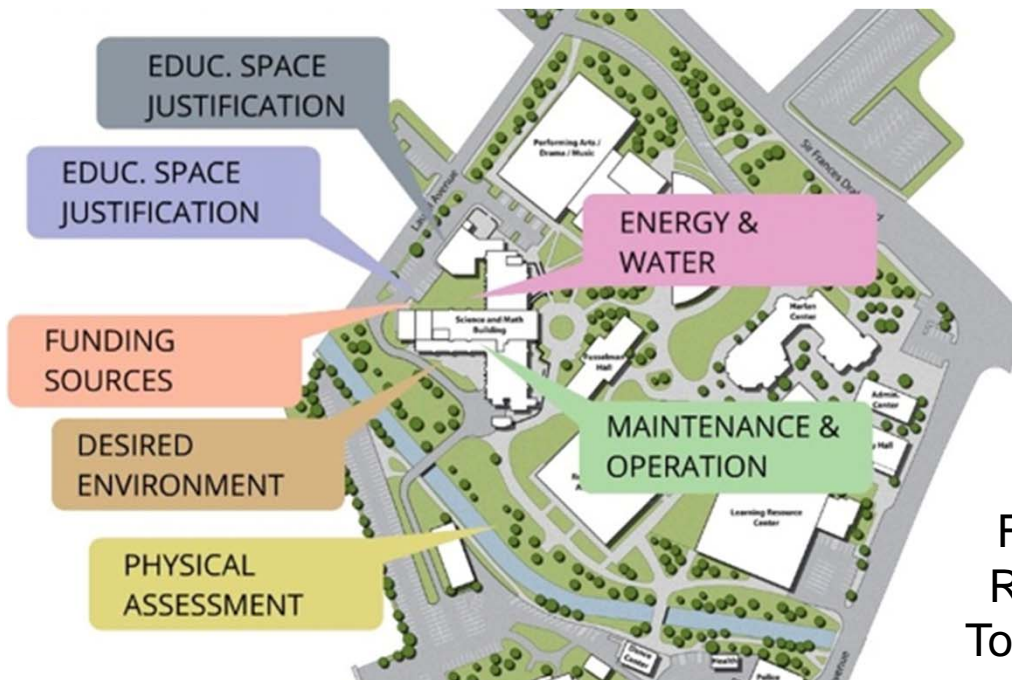
Tie to existing data sources

- FUSION Database
- Alignment For Accuracy
 - Square Footage
 - Assessment
 - Space Use
- Project Planning
 - 5 year Cap Plan
 - Individual Projects

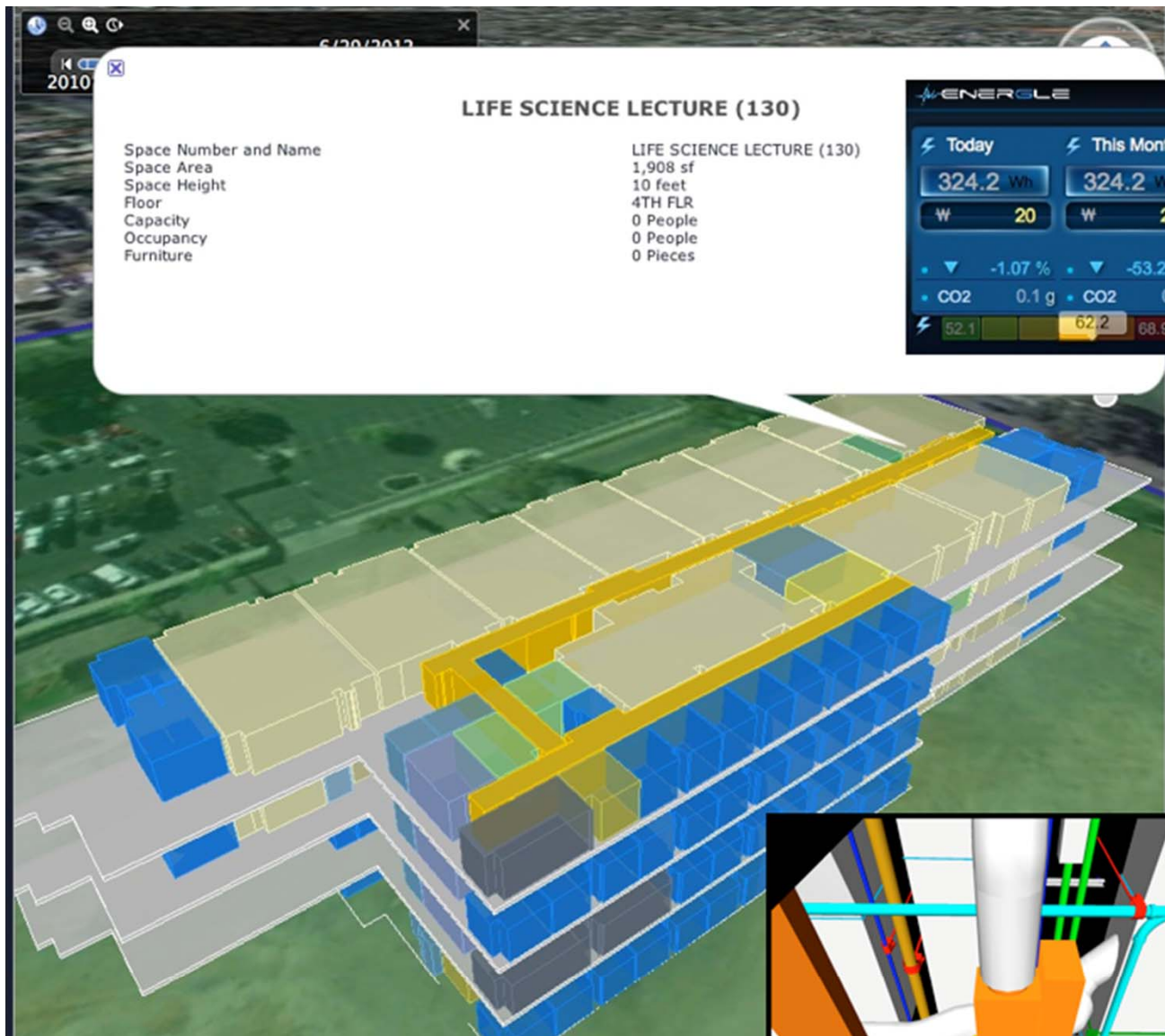


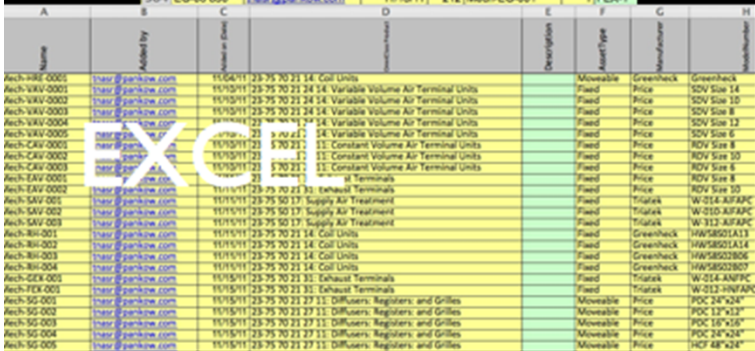


Facility Programming, Design, and Costing

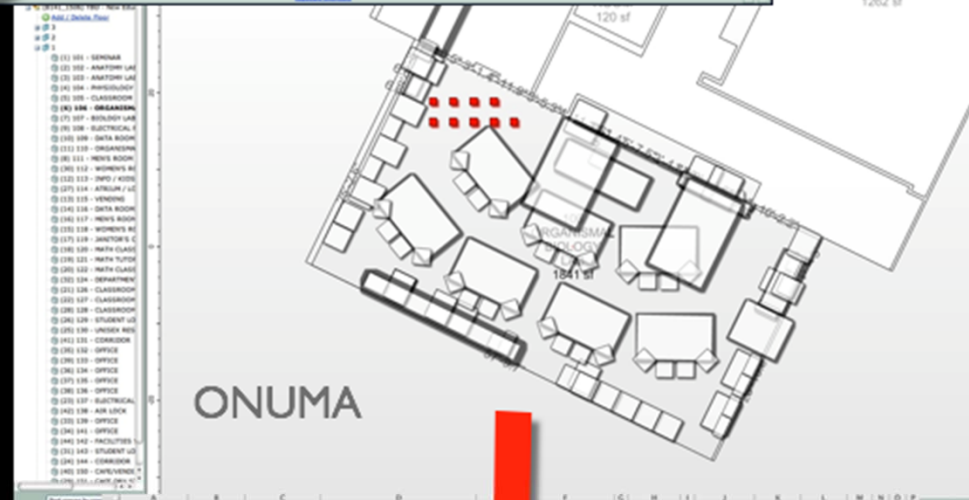
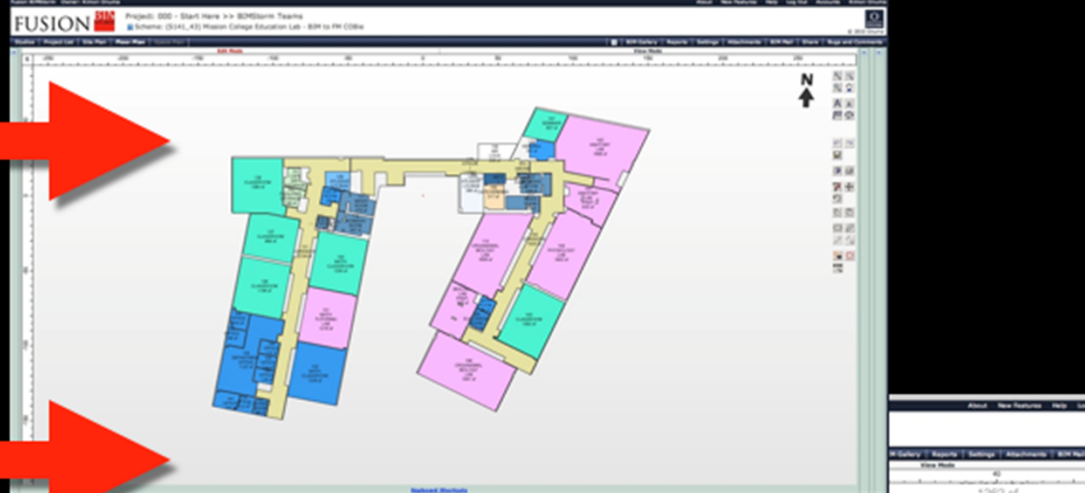


Facility Management
Return on Investment
Total Cost of Ownership





	A	B	C	D	E	F	G
	Component Name	Added by	Added on (Date)	Scope Number	Type Name	Quantity	System
366	EG-11-90	hsar@pqnw.com	11/18/11	35	Mech-EG-002	1	FE-X-1
367	EG-02-125	hsar@pqnw.com	11/18/11	38	Mech-EG-001	1	FE-X-1
368	EG-06-080	hsar@pqnw.com	11/18/11	102	Mech-EG-001	4	FE-X-1
369	EG-06-920	hsar@pqnw.com	11/18/11	103	Mech-EG-001	2	FE-X-1
370	EG-05-770	hsar@pqnw.com	11/18/11	104	Mech-EG-001	4	FE-X-1
371	EG-06-870	hsar@pqnw.com	11/18/11	106	Mech-EG-001	4	FE-X-1
372	EG-06-850	hsar@pqnw.com	11/18/11	107	Mech-EG-001	2	FE-X-1
373	EG-05-170	hsar@pqnw.com	11/18/11	108	Mech-EG-005	1	FE-X-1
374	EG-05-740	hsar@pqnw.com	11/18/11	110	Mech-EG-001	4	FE-X-1
375	EG-13-300	hsar@pqnw.com	11/18/11	111	Mech-EG-003	1	FE-X-1
376	EG-13-390	hsar@pqnw.com	11/18/11	112	Mech-EG-003	1	FE-X-1
377	EG-06-870	hsar@pqnw.com	11/18/11	201	Mech-EG-001	4	FE-X-1
378	EG-05-710	hsar@pqnw.com	11/18/11	202	Mech-EG-001	2	FE-X-1
379	EG-05-740	hsar@pqnw.com	11/18/11	203	Mech-EG-001	4	FE-X-1
380	EG-05-440	hsar@pqnw.com	11/18/11	206	Mech-EG-001	4	FE-X-1
381	EG-S1-470	hsar@pqnw.com	11/18/11	108	Mech-EG-005	1	FE-X-1
382	EG-05-410	hsar@pqnw.com	11/18/11	110	Mech-EG-001	4	FE-X-1
383	EG-12-200	hsar@pqnw.com	11/18/11	259	Mech-EG-003	1	FE-X-1
384	EG-06-830	hsar@pqnw.com	11/18/11	212	Mech-EG-001	1	FE-X-1

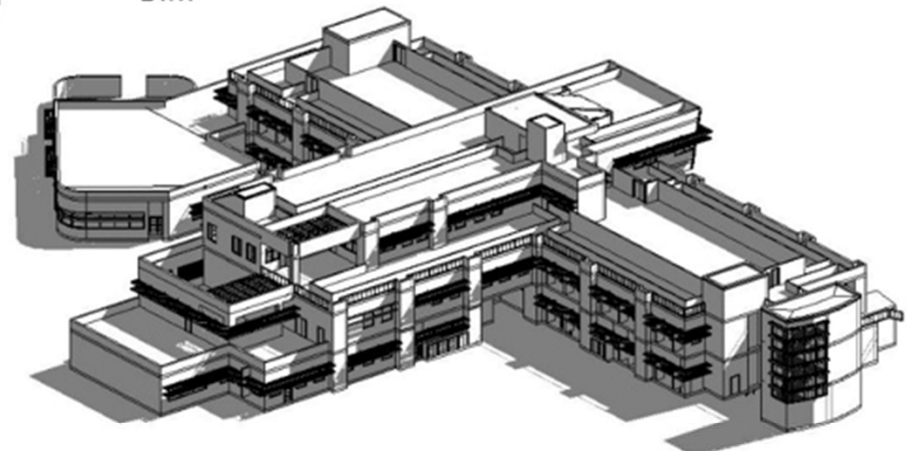
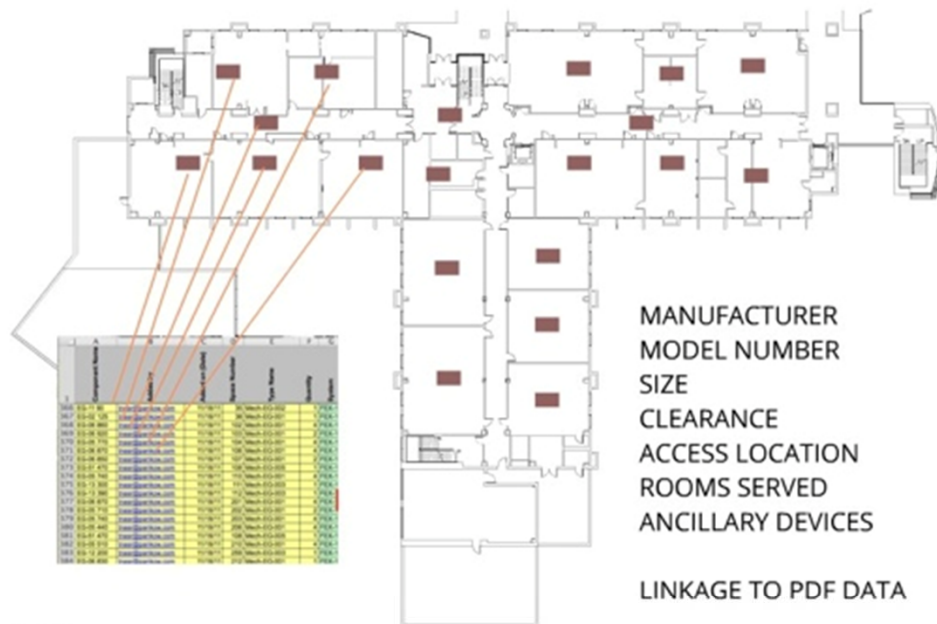


Meta-Data Management
Fluidly linked between REVIT
model and Onuma, providing
rich
COBie formatted information

COBie at COLLEGE OF MARIN

Tracking of pertinent building systems information; utilization of

- construction document schedules
- contractor M&O deliverables
- insert data from systems into table, linked to building
- all other pdf information can be linked to the 'BIM'



Collecting data within the COBie standard

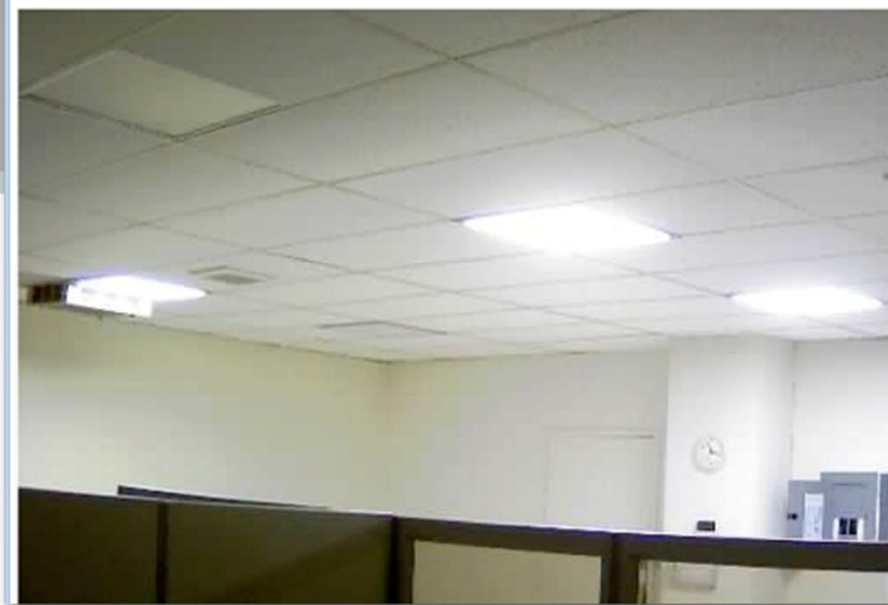
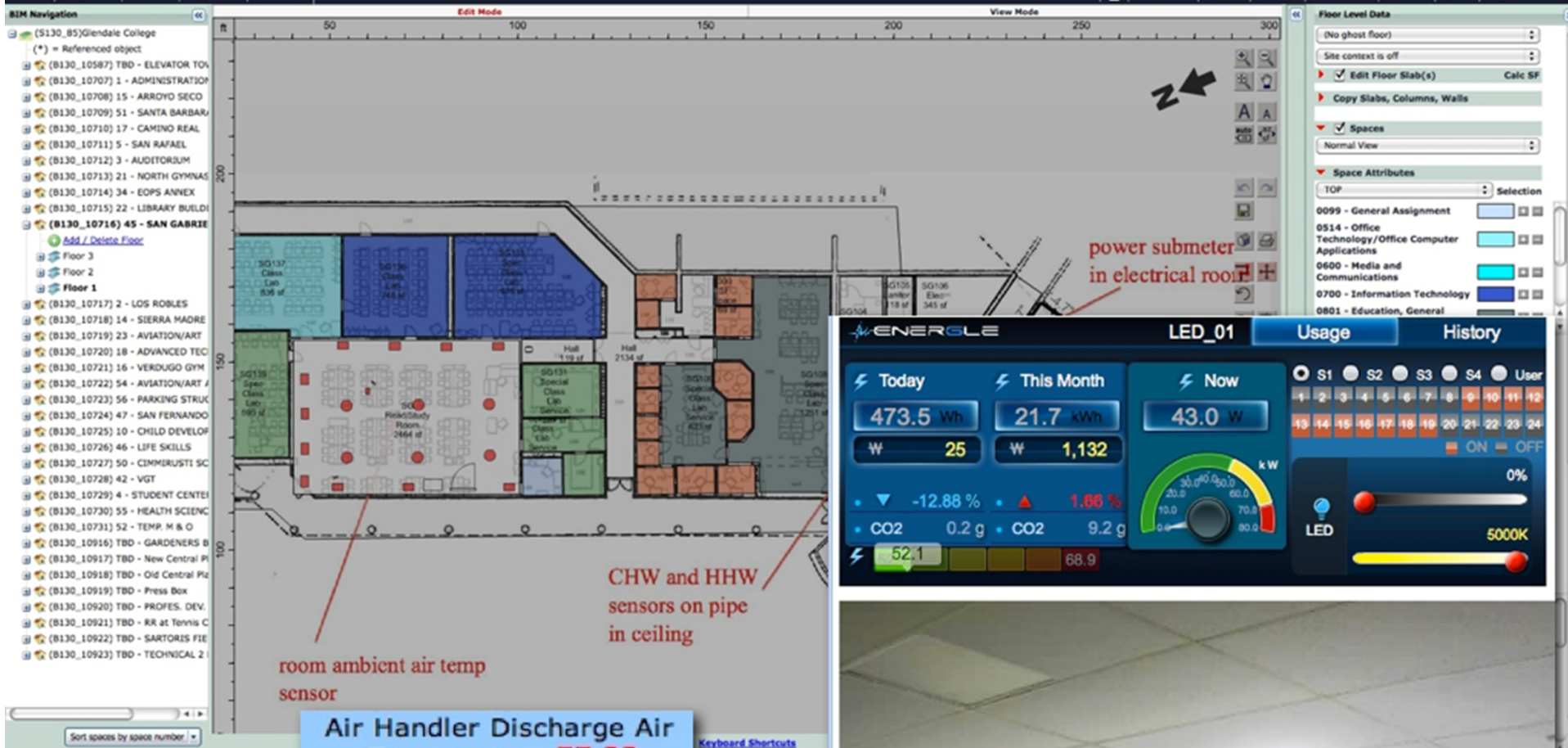
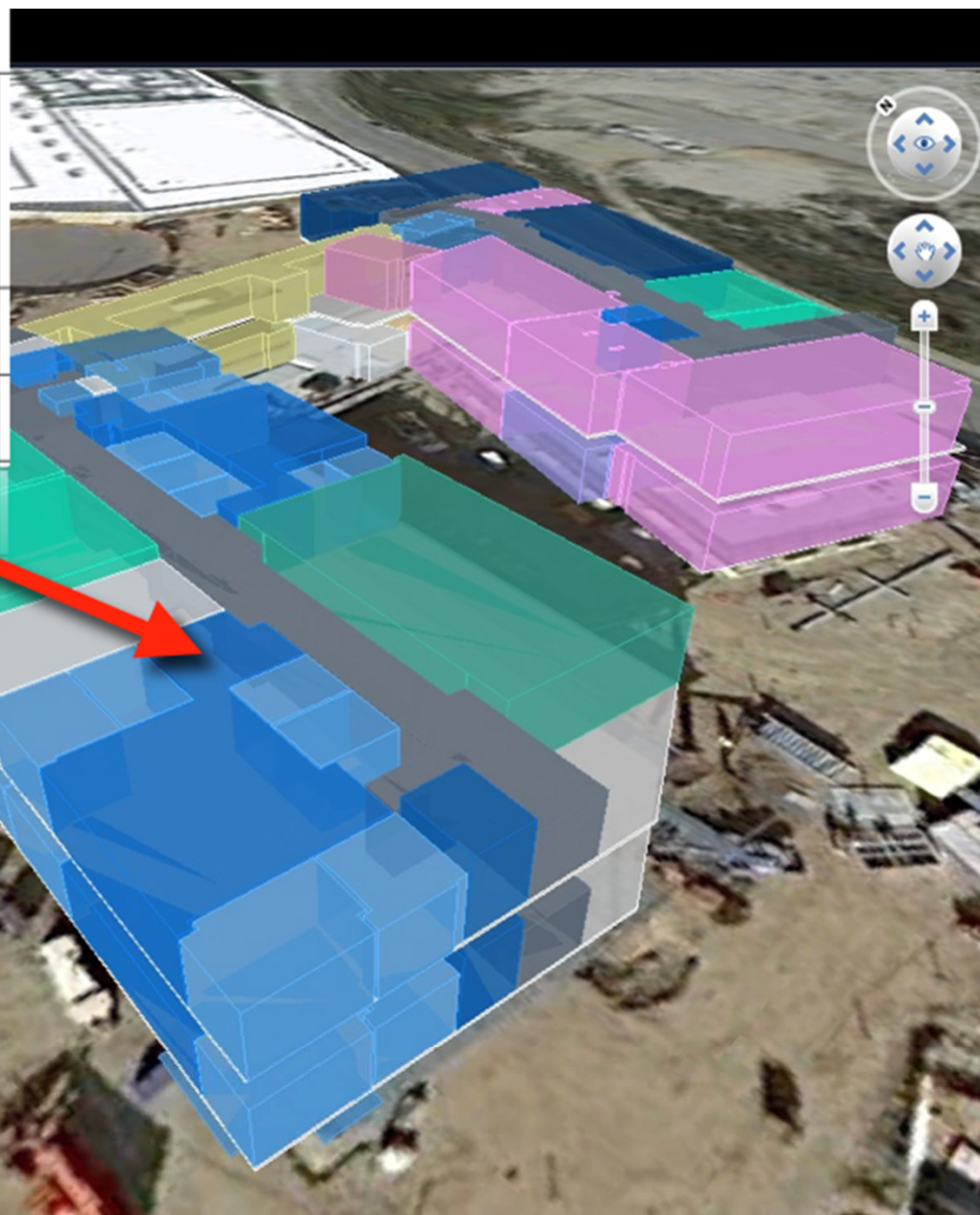


Table 11: Room Design Data

Room Name	Space Temperature Setpoints [°F]		Outdoor Air Flow Rate [cfm]
	Cooling	Heating	
Typical Exam Room - ED	72	68	2 ACH
Typical Exam Room - MOB	75	68	20 CFM



Advancing to what's next...



Gaming technologies allow for first-person experience in 3D environments. User and Stakeholder visualizations foster greater success.

Seeking connection of facilities data to first-person, 3D visualization

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