

# buildingSMART/USACE: BIM Contracted Information Exchanges Workshop

July 23-25, 2008

# Topics of Discussion

- Bentley Participation Statement and Industry Observations
- Introduction to Contracted Information Exchanges
- Space Compliance Information Exchanges
- Coordination View Information Exchanges
- Construction Operations Building Information Exchanges



# Participation Statement and Industry Observations



# Bentley Participation in Workshop

## **SCIE (space compliance information exchange)**

Bentley Architecture provides tools to easily define, manage and report on spaces. An IFC data file can be exported for downstream analysis.

## **CVIE (coordination view information exchange)**

Bentley ProjectWise Navigator provides tools for BIM review, clash detection, data reporting and drawing publishing. An IFC data file can be exported for downstream analysis.

## **COBIE (construction operations building information exchange)**

Bentley's "BIM suite" (Bentley Architecture, Bentley Building Mechanical Systems, and Bentley Structural) provides a multi-disciplinary design environment. An IFC data file can be exported and converted to the COBIE Excel Workbook using a 3<sup>rd</sup> party tool (ifcCOBIE from AEC3). This is a prototype demonstrating capability.



# Vendor Challenge

- Bentley's commitment, industry observations
- How to create a BIM with data rich components
- Live demo showing process
- How to export IFC and import to COBIE Excel Workbook



# Bentley's Commitment to Interoperability

- ✓ Bentley has been a member of the International Alliance for Interoperability (now buildingSMART) since 1995
  - Bentley is active in the IAI and is on several regional chapter boards, e.g. US, UK, German-speaking, and Japan
  - Bentley is providing global and regional financial support for the IAI/buildingSMART
- ✓ Bentley TriForma was first certified by the IAI as IFC2x compliant in May 2003
  - Bentley supports IFC2x2, the Singapore code checking view
  - Bentley was certified by the IAI as compliant with the Extended Coordination View of IFC2x3 Step 1 in June 2006 and Step 2 compliant in March 2007 > [link](#)



# Bentley's Commitment to Interoperability

- Bentley participated and presented in the IFC based HITOS Interoperability Demonstration held in conjunction with the IAI/buildingSMART meeting at the National Academies of Science in Washington, DC in October of 2006.
- ✓ Bentley provided prototypical Service Oriented Architecture IFC client for the Open Geospatial Consortium (OGC) Open Web Services demonstration number 4 (OWS-4) in December of 2006 – reference [link](#)
- Bentley published an IFC position paper in March 2007 – reference [link](#)
- ✓ Bentley is certified by the General Services Administration (GSA) as compliant with the GSA specific Concept Design View of IFC in May 2007 – reference GSA publication, page 9 [link](#)



# Interoperability Projects (2008+)

- buildingSMART/USACE > BIM Contracted Information Exchange - space coordination, clash detection, COBIE data exchange
- OGC > AECOO-1 Testbed - quantity take-off to support cost estimating (IFC), energy analysis for building energy performance and project collaboration for decision support (IFC)
- ICC > SMARTcodes - auto code checking of BIMs (IFC) for compliance with energy, egress and accessibility requirements (codes and standards)
- GSA > BIM Guide 05 - energy performance and operations
- AGC > AGCxml Project - set of XML schemas for the transactional data that is now commonly exchanged in paper documents

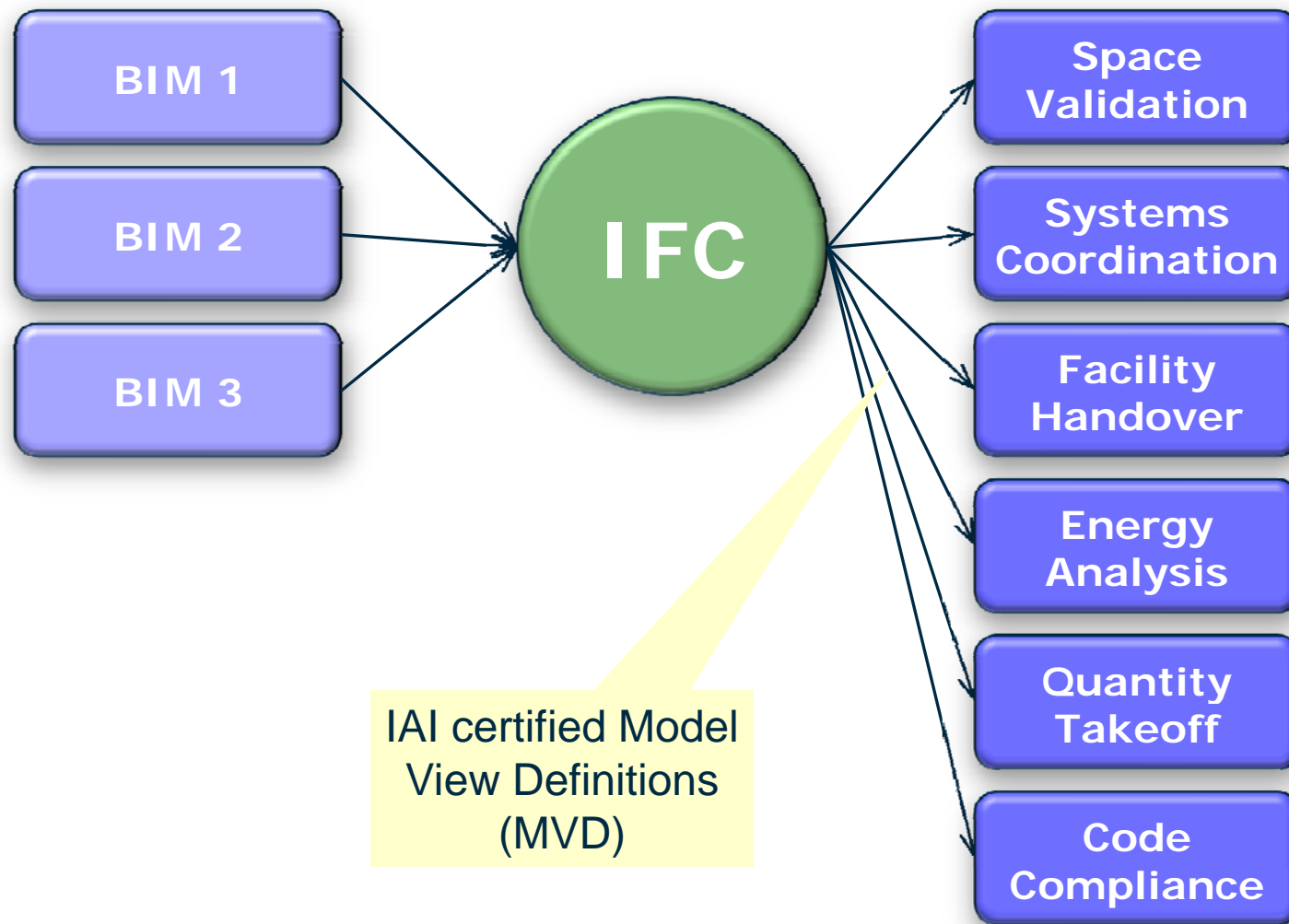


# IFC Data Exchange

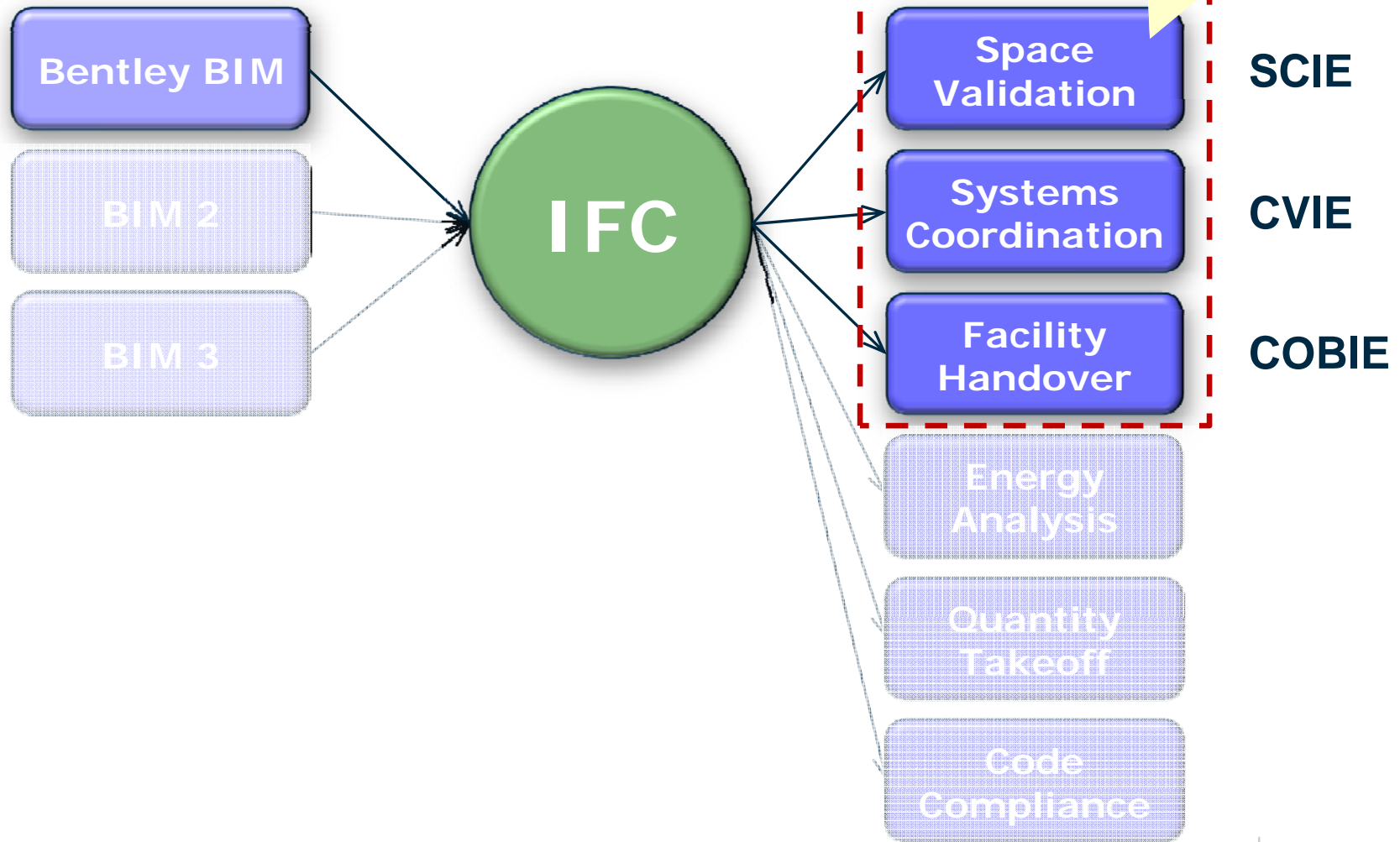
## IFC

- Focused on downstream analysis and data repurposing where appropriate; many-to-many application data exchange
- <100% - any translation has potential for content loss (i.e. proprietary formats) and limits capability to reconstitute

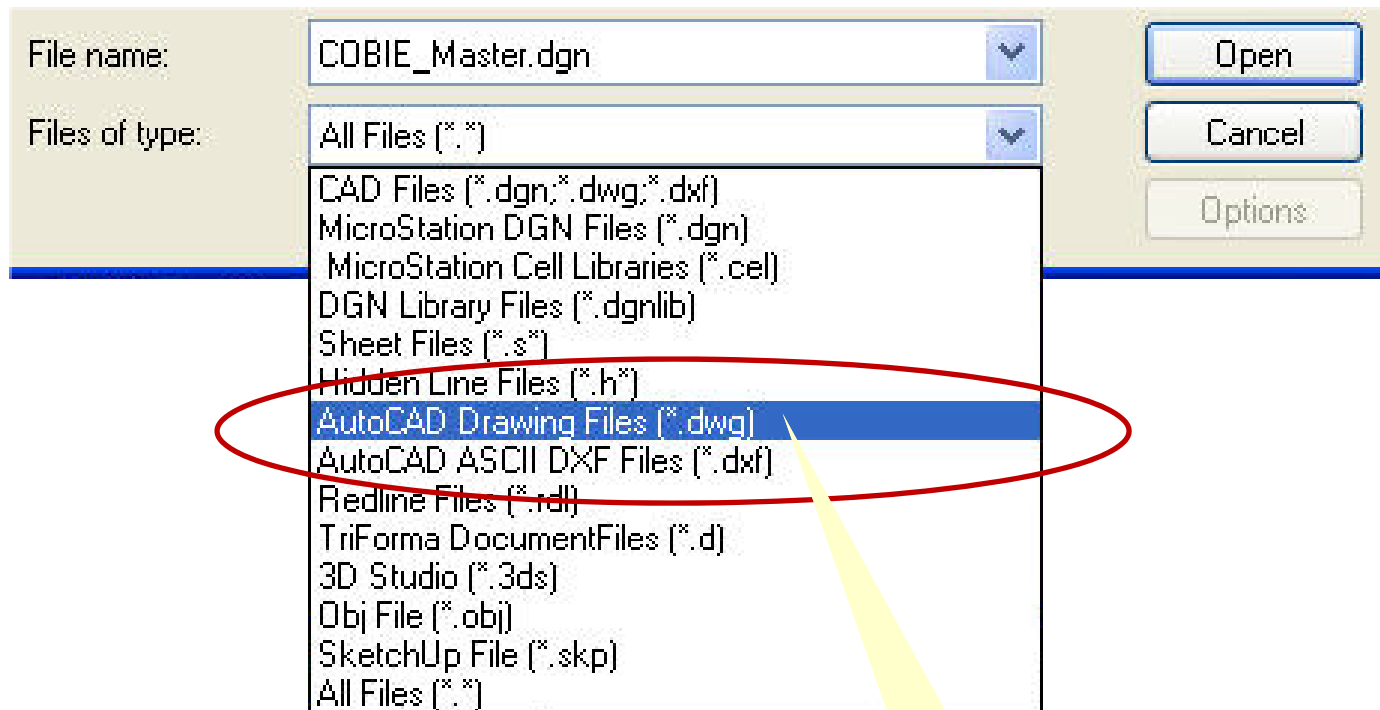
# IFC Data Exchange



# buildingSMART/USACE



# Direct Data Exchange



Read/Write  
DWG directly

# AEC Software Interoperability



Helio, Andrew [Logout] | United States [Change] | News | Bentley SELECT

## Autodesk and Bentley to Advance AEC Software Interoperability

Press Releases & News Alerts

Autodesk

08 July 2008

SAN RAFAEL, Calif. and EXTON, Pa. – At a joint press conference, Autodesk, Inc. (NASDAQ: ADSK) and Bentley Systems, Incorporated, two of the leading providers of design and infrastructure software, today announced an agreement to expand interoperability between their portfolios of architectural, engineering, and construction (AEC) software. Autodesk and Bentley will exchange software libraries, including Autodesk RevitDWG, to improve the ability to read and write the companies' respective DWG and DGN formats in mixed environments with

Bentley PR  
Ron Kuhfeld  
Public Relations Manager  
610-321-3493  
[Contact Bentley PR](#)



[« Back to Press Releases](#)

submit either DWG or DGN files. By improving fidelity of work shared between the two file formats, users will be able to focus on being creative and getting work done, rather than being constrained by file-compatibility considerations.

Interoperability has emerged as a critical issue for users of design and engineering software. A 2004 study by the U.S. National Institute of Standards and Technology found that users bear direct costs of almost \$16 billion annually from time wasted due to inadequate AEC software interoperability. By virtue of this agreement, and the interoperable offerings that it will enable, AEC firms will be free to employ software tools of choice from either Autodesk or Bentley to accept or submit either DWG or DGN files. By improving fidelity of work shared between the two file formats, users will be able to focus on being creative and getting work done, rather than being constrained by file-compatibility considerations.

Through supporting the reciprocal use of their available APIs, Autodesk and Bentley will enable AEC project teams to combine products from both providers within integrated workflows. For instance, a design team could use a mixture of Autodesk and Bentley software, such as Autodesk's Revit platform and Bentley's STAAD and RAM structural products, and simulate and analyze their designs or manage project information using Autodesk NavisWorks software or Bentley's ProjectWise.

Norbert Young, FAIA, president of McGraw-Hill Construction and former chairman of the International Alliance for Interoperability in North America, said, "This groundbreaking agreement directly addresses many of the critical issues detailed in the October 2007 McGraw-Hill Construction study on interoperability in the construction industry ([http://construction.ecnext.com/mcgraw\\_hill/include/SMR1.pdf](http://construction.ecnext.com/mcgraw_hill/include/SMR1.pdf)). I applaud both companies for their foresight and leadership."

Added Patrick MacLeamy, FAIA, CEO of global architectural firm HOK and a founder and current chairman of the International Alliance for Interoperability (IAI), "As a longtime advocate of interoperability, I welcome this agreement as an important step toward enabling AEC information to be more broadly shared, increasing the value of BIM to our clients."

"Autodesk recognizes that many customers use our products in mixed environments, and this agreement will help to better support these firms," said Jay Bhatt, senior vice president, Autodesk AEC Solutions. "As part of our commitment to provide technology that improves productivity and efficiency across the AEC industry, we're pleased to enter into this agreement with Bentley Systems -- Autodesk's largest development partner -- and together help customers design, build, operate, and maintain the world's infrastructure."

"Bentley and Autodesk share a goal of enabling the creation and operations of better-performing infrastructure," said Greg Bentley, CEO of Bentley Systems. "Realizing that our mutual users bear unnecessary costs resulting from lack of interoperability, we came together to finally make information reuse the norm. By raising its sights beyond file format issues, the resource-constrained AEC community can better serve us all."

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# Direct Data Exchange

## DIRECT

- “Gold” standard for data exchange - highest fidelity; support native file formats
- Effort justified with impact of largest number of users, impact on industry, user benefits
- Addresses the limitations of IFC

# REVIT Plug-in for MicroStation



# Introduction to Contracted Information Exchanges

Wednesday, July 23 (1 - 5pm)





Wednesday, 23 July 2008. 1:00pm– 5:45pm  
Theme: Introduction to Contracted Information Exchanges

1:00pm	Welcome and Announcements <ul style="list-style-type: none"><li>- U.S. Army, Corps of Engineers</li><li>- Federal Facility Council</li><li>- buildingSMART Alliance</li><li>- buildingSMART International</li></ul>	James Dalton Kevin Lewis Peter Smeallie Bill Brodt
1:30pm	Information Exchange Requirements Process	Bill East
2:00pm	buildingSMART International <ul style="list-style-type: none"><li>- Information Exchange Software Specification</li><li>- Information Delivery and Model View Definitions</li><li>- Industry Foundation Class Resources</li></ul>	Jeff Wix
2:30pm	Break	
3:00pm	BIM Vendors Process	Nick Nisbet
3:15pm	BIM Vendor Challenge (Attachment 1) <ul style="list-style-type: none"><li>- Autodesk</li><li>- Bentley</li><li>- Onuma</li></ul>	Nick Nisbet
5:30pm	Agenda for Following Days and Wrap-Up	Bill East
5.45pm	Close	

## Attachment 1 - BIM Vendors Challenge Description

BIM vendors will have already selected a model for demonstration and produced their COBIE file that was evaluated prior to the meeting.

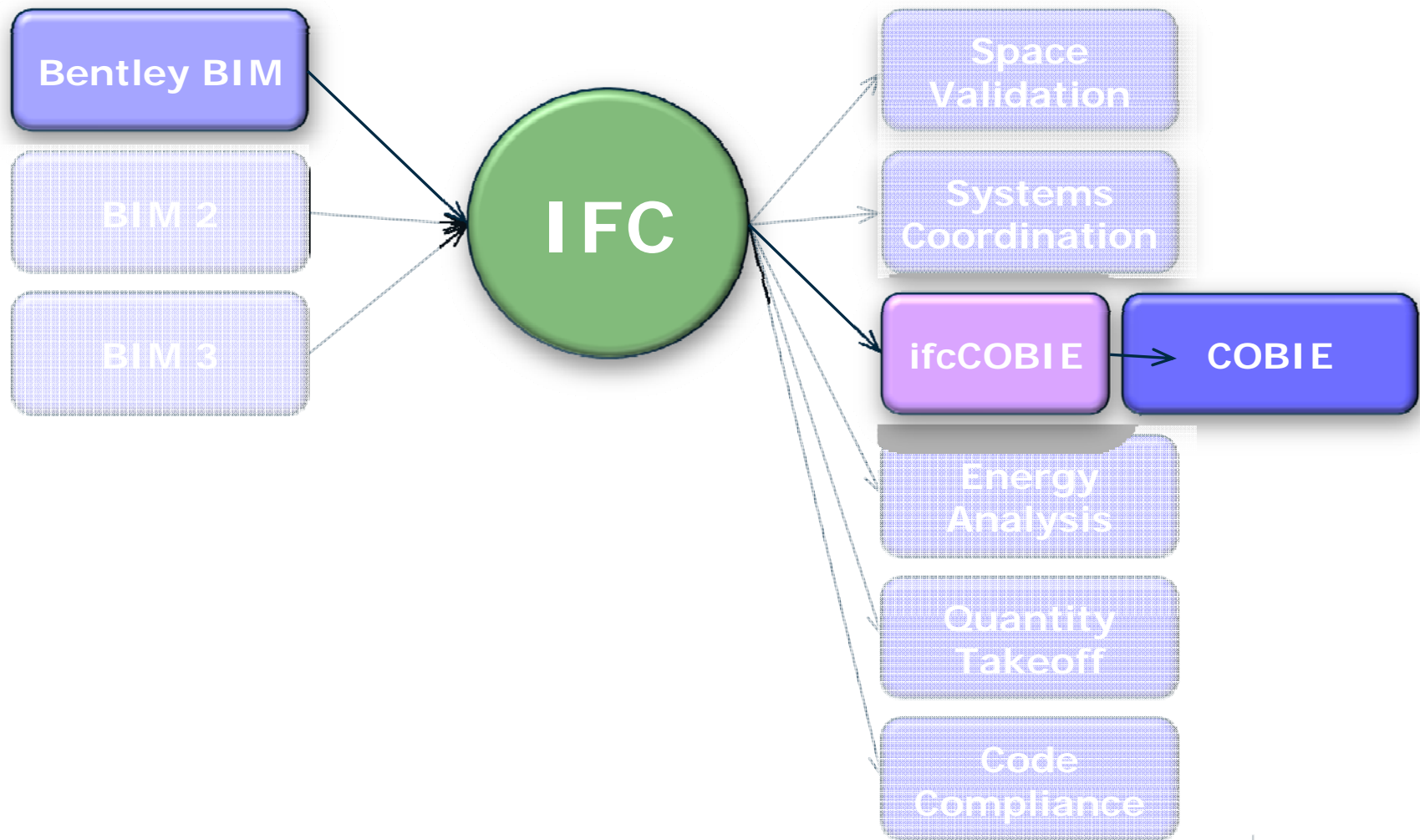
- (1) The vendor will view/fly through their selected model, highlighting facilities used to capture contractually required data (live)
- (2) Vendor will be asked that at least one of each of the following changes be made (live)
  - (a) name of room
  - (b) name of equipment
  - (c) type of equipment for given component
  - (d) move equipment from one room to another
- (3) The vendor will export COBIE or IFC data from their application (live)
- (4) IFC-COBIE translator produces the spreadsheet version of the data set (using pre-processed file)
- (5) COBIE Spreadsheet will be reviewed (using pre-processed file)
  - (a) by inspection to identify any issues of interest
  - (b) using the web-based checking application to further validate the data
- (6) The vendor will discuss the results of the evaluation (using pre-processed file)

# Vendor Challenge

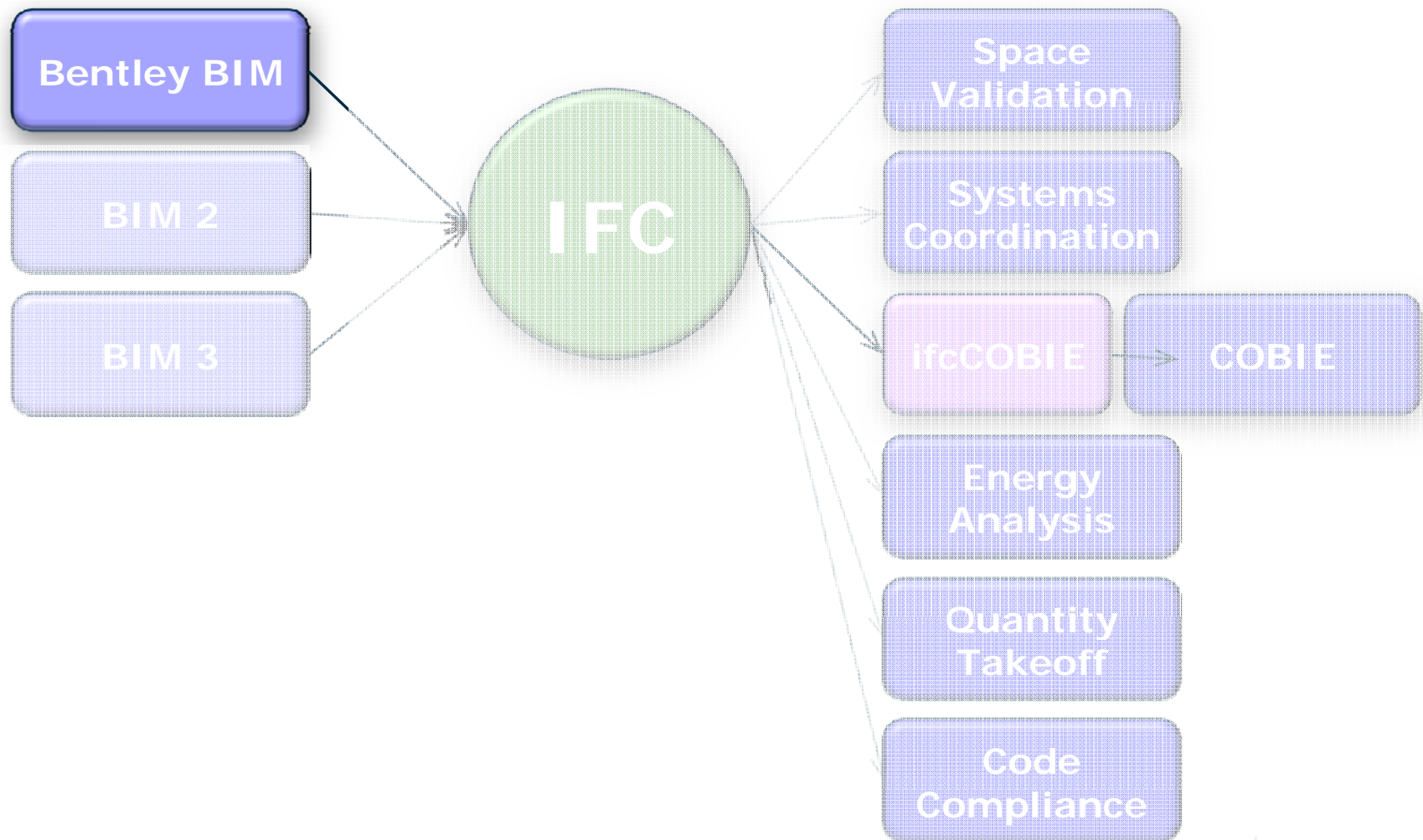
- Bentley's commitment, industry observations
- How to create a BIM with data rich components
- Live demo showing process
- How to export IFC and import to COBIE Excel Workbook



# BIM > IFC > ifcCOBIE > COBIE



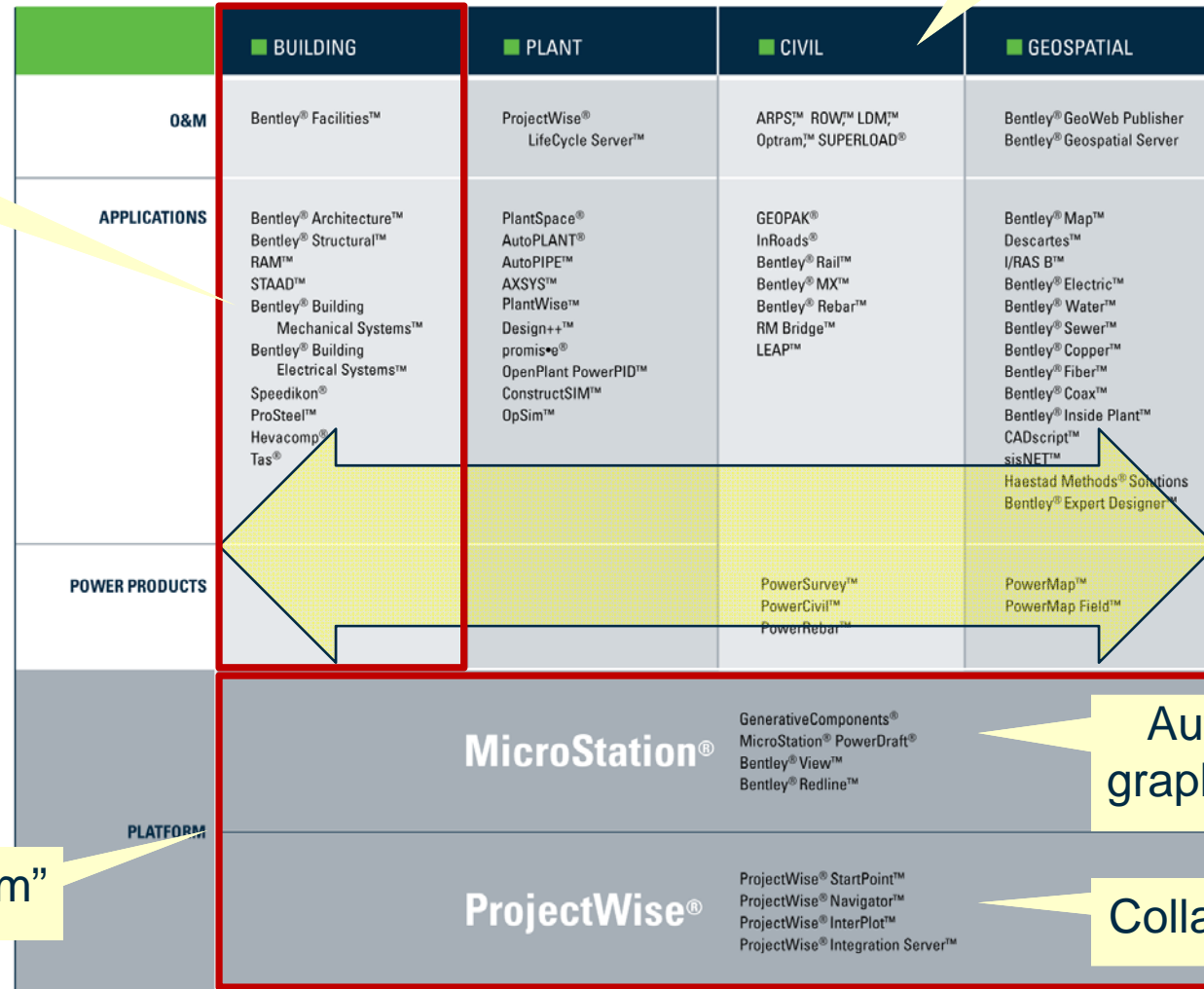
# BIM (multidisciplinary)



# BIM Platform

BIM

“Industry”  
solutions



“Platform”

Authoring  
graphics/data

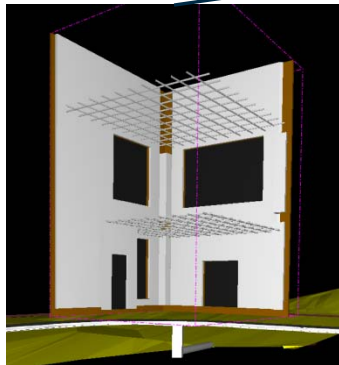
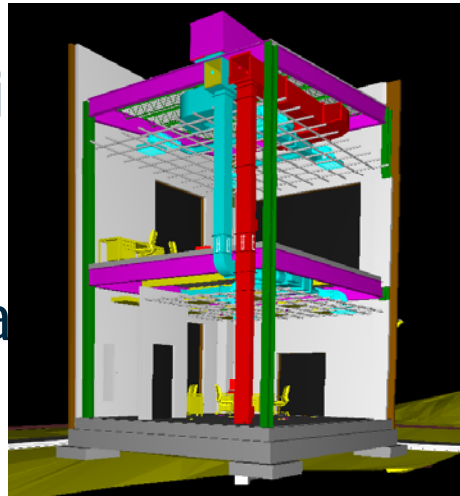
Collaboration



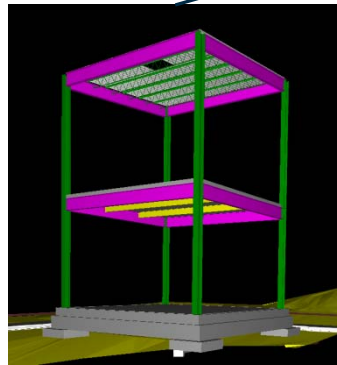
# Multidisciplinary BIM Collaboration

Bentley BIM

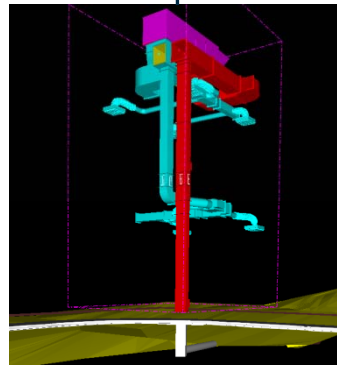
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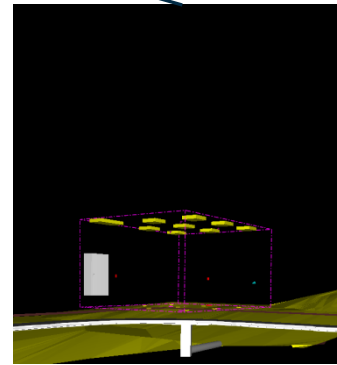
ARCH



STRUCT



MECH



ELEC

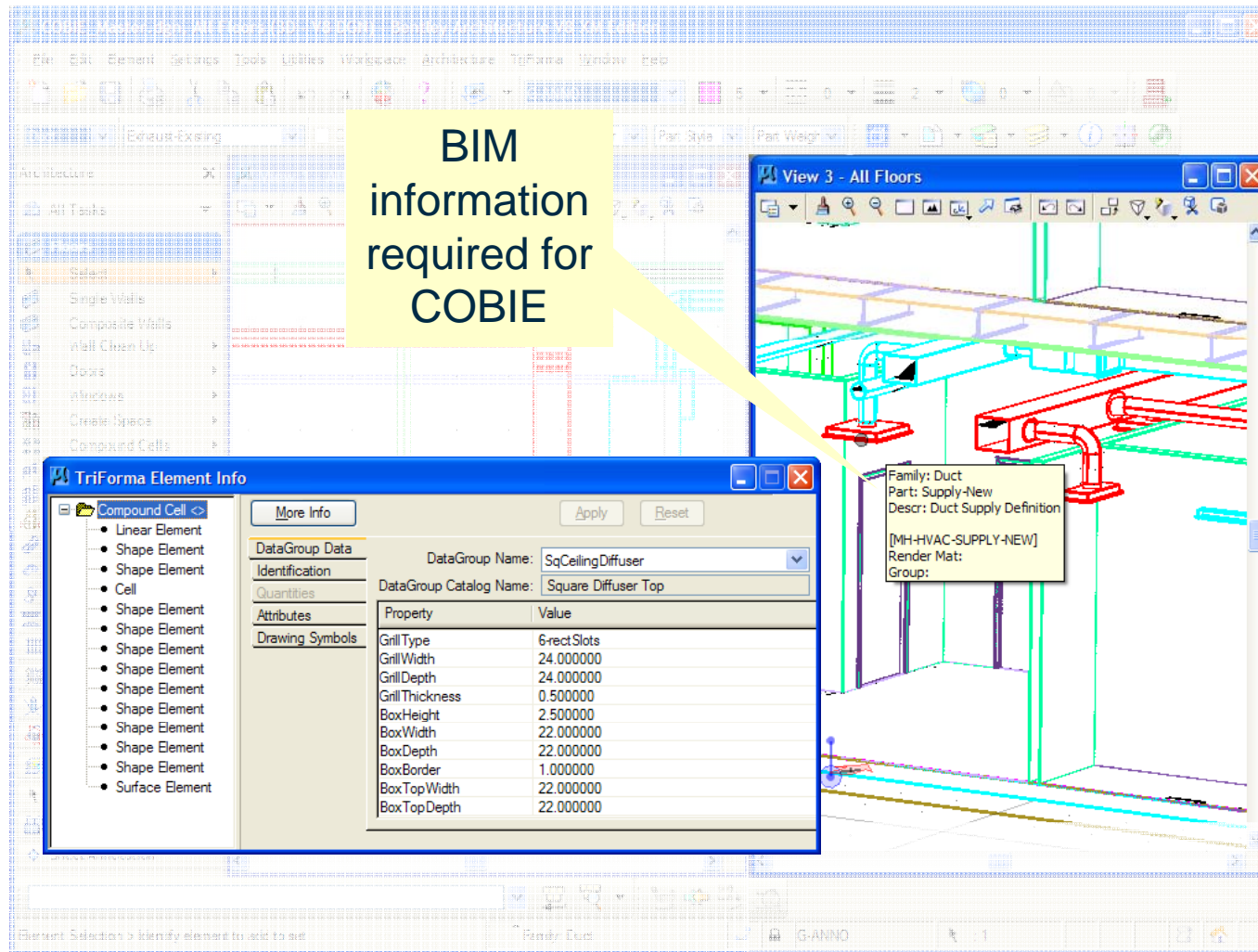


FM





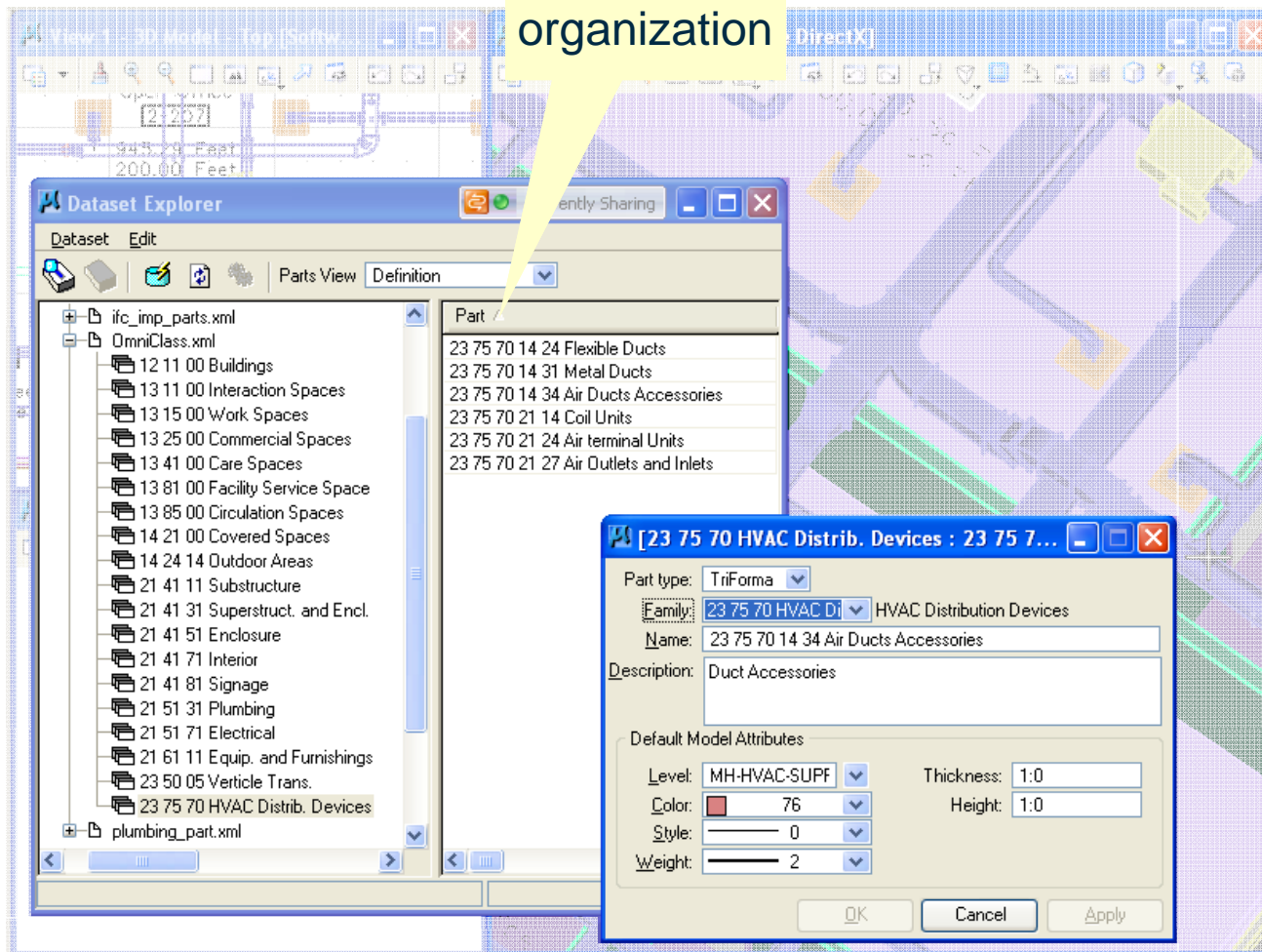
# BIM - Intelligent Objects > IFC





# OmniClass

OmniClass  
organization

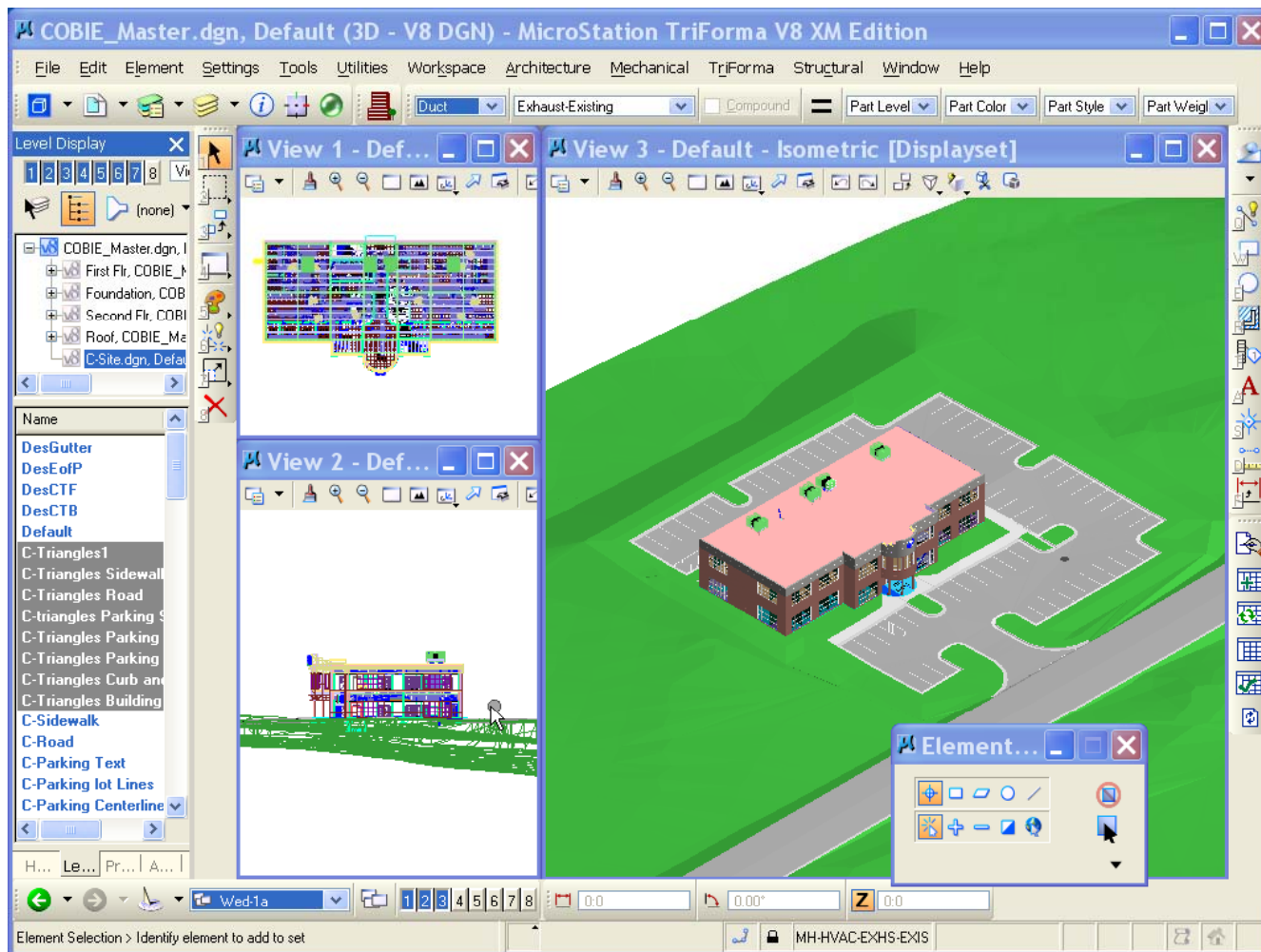


# Vendor Challenge

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# BIM - Design and Managing Data

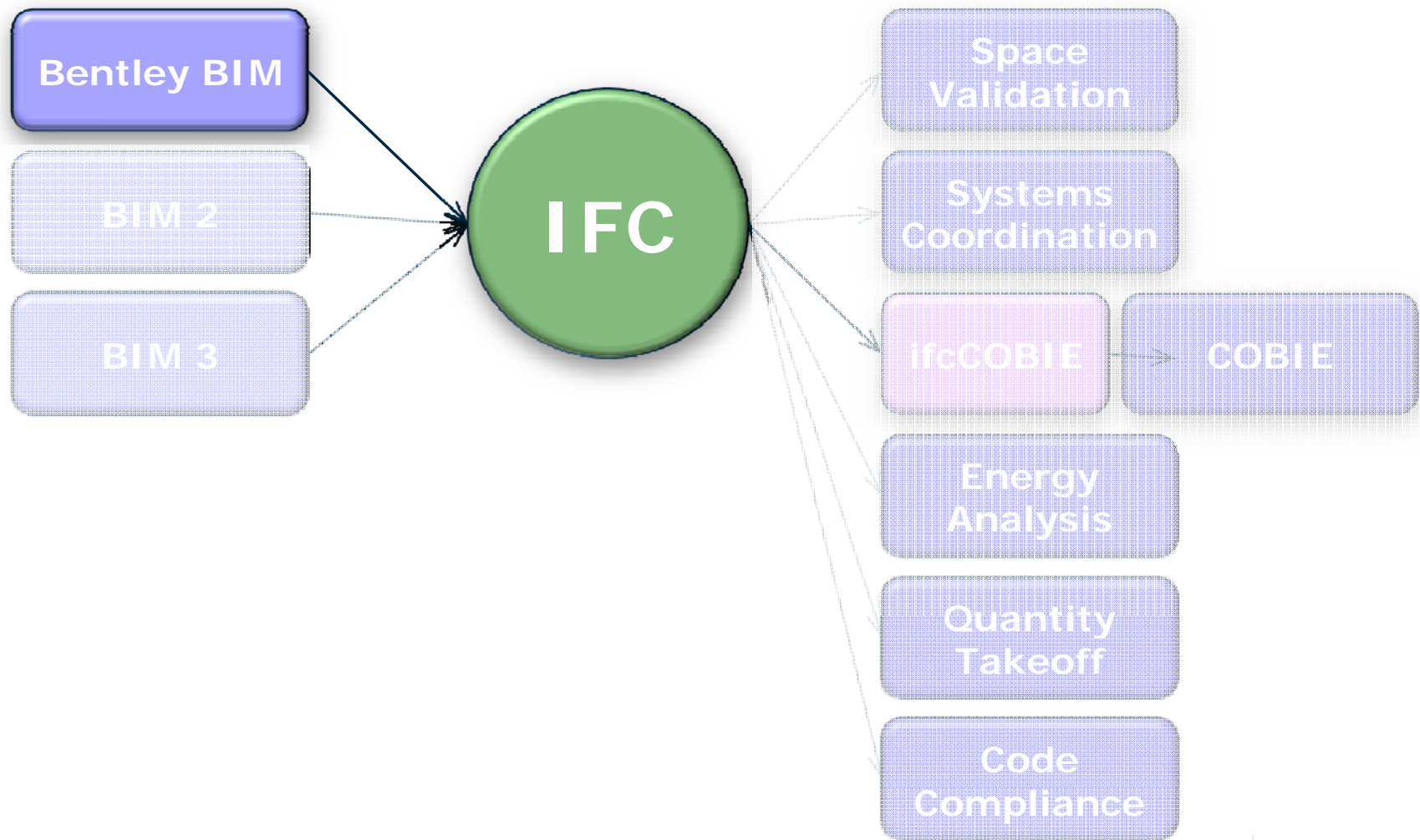


# Vendor Challenge

- Bentley's commitment, industry observations
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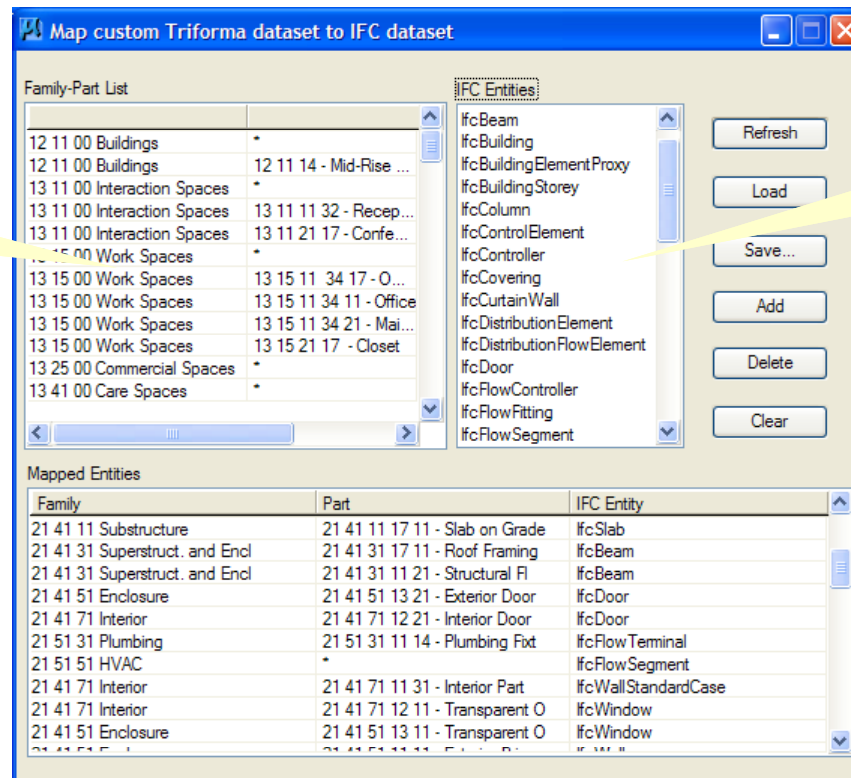
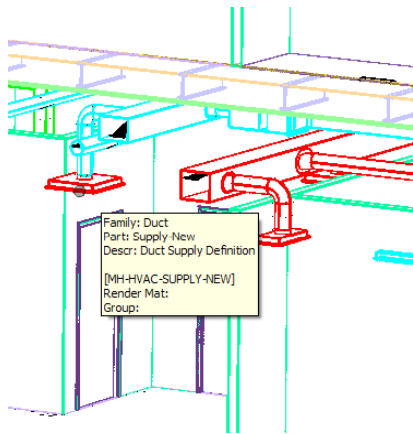


# BIM > IFC > ifcCOBIE > COBIE



# BIM Components > IFC Descriptions

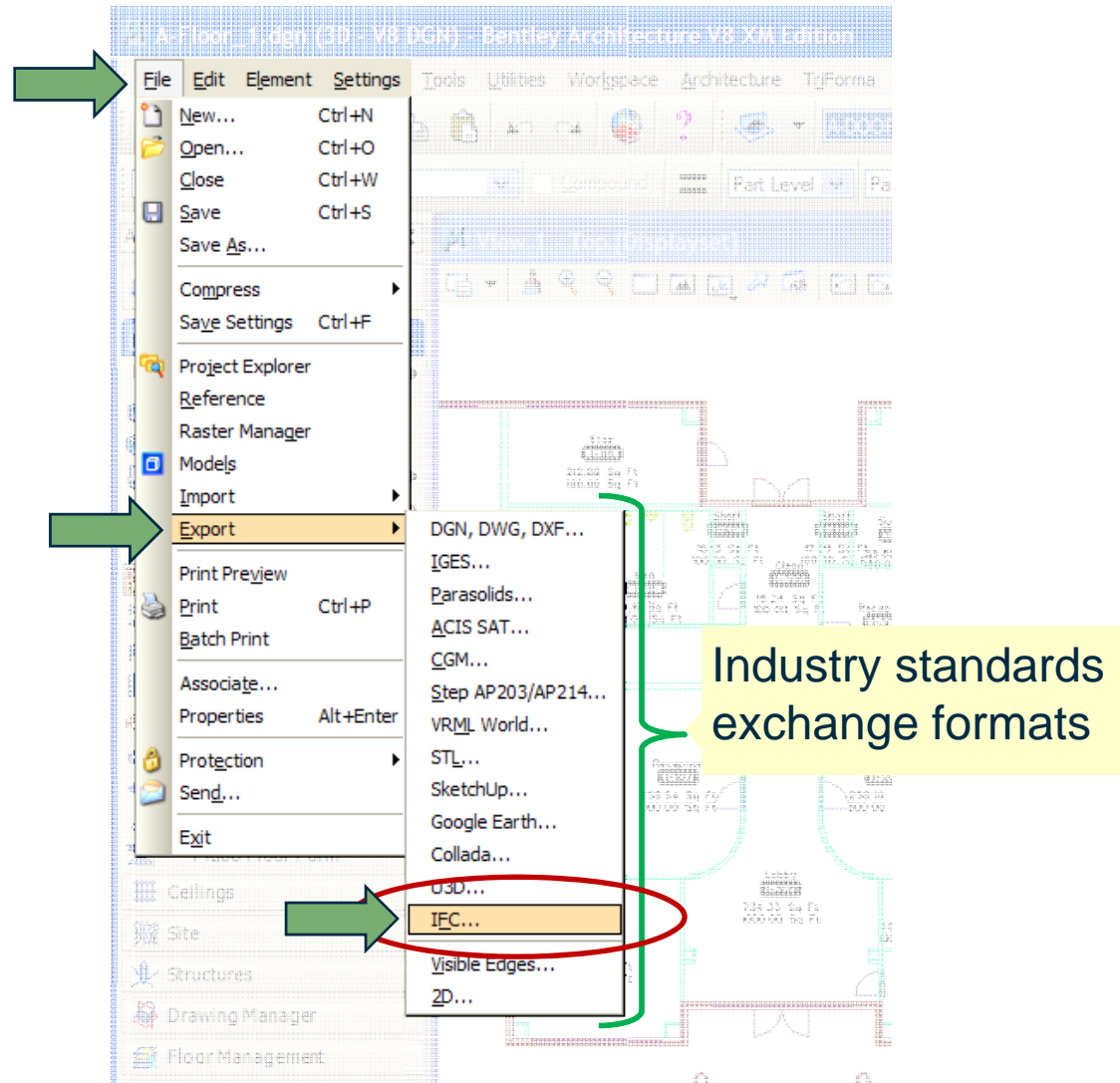
BIM  
components



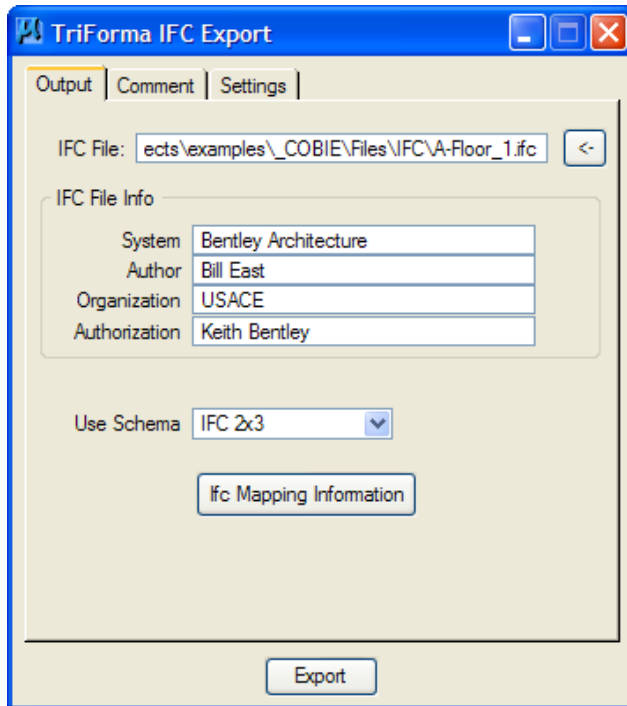
IFC  
descriptions



# Creating an IFC File



# IFC Project Information



TriForma IFC Export

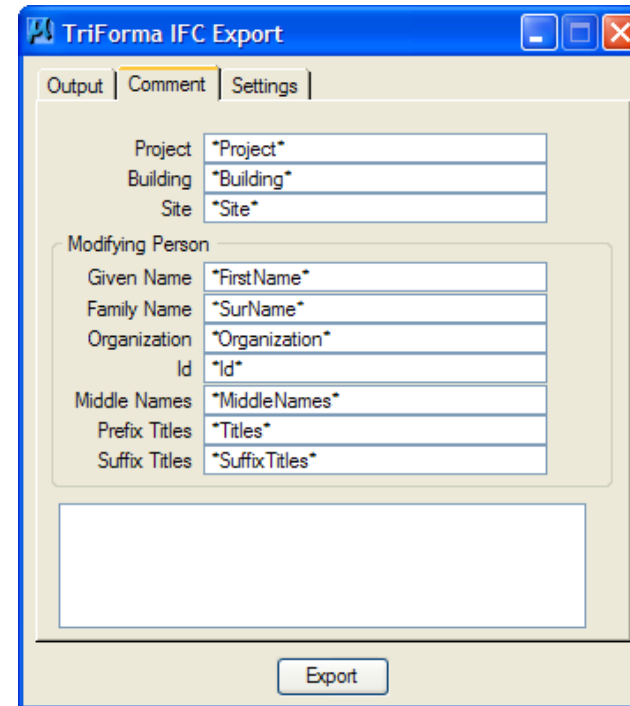
Output | Comment | Settings

IFC File:  <-

IFC File Info

System	<input type="text" value="Bentley Architecture"/>
Author	<input type="text" value="Bill East"/>
Organization	<input type="text" value="USACE"/>
Authorization	<input type="text" value="Keith Bentley"/>

Use Schema:  ▼



TriForma IFC Export

Output | Comment | Settings

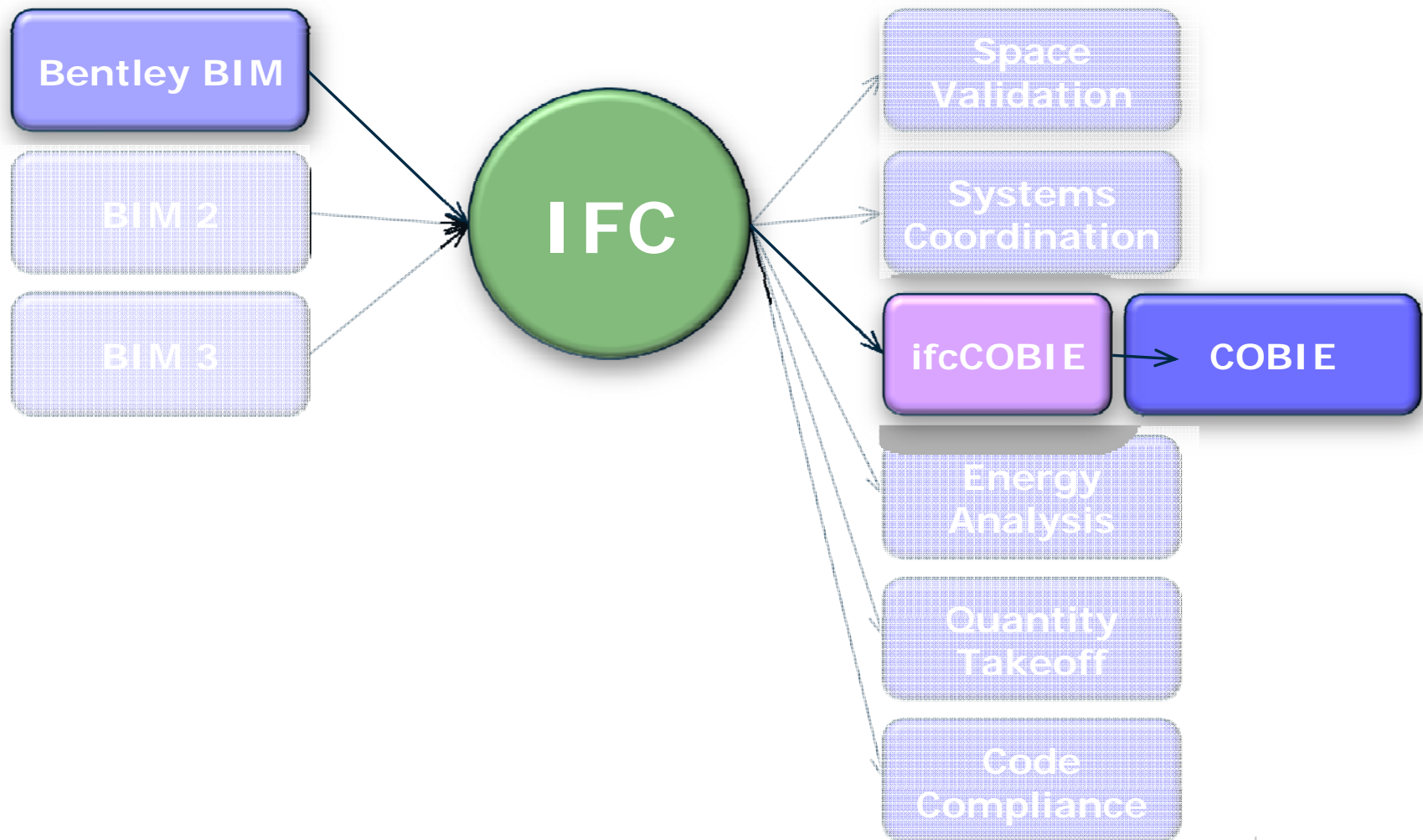
Project	<input type="text" value="*Project*"/>
Building	<input type="text" value="*Building*"/>
Site	<input type="text" value="*Site*"/>

Modifying Person

Given Name	<input type="text" value="*FirstName*"/>
Family Name	<input type="text" value="*SurName*"/>
Organization	<input type="text" value="*Organization*"/>
Id	<input type="text" value="*Id*"/>
Middle Names	<input type="text" value="*MiddleNames*"/>
Prefix Titles	<input type="text" value="*Titles*"/>
Suffix Titles	<input type="text" value="*SuffixTitles*"/>



# BIM > IFC > ifcCOBIE > COBIE



# COBIE Spreadsheet Checker

Page 1 of 17

## COBIE July 2008 File Checker

Version 0.8 (21-Jul-08)

Testing conducted on file 'test.xml'

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**Objective:** Shows how COBIE data files may be checked for consistency use a rule-based checker.

**Status:** Evaluates consistency of COBIE designer worksheets.

**Report Contents:** Based on user selections the results presented in this report refer to all COBIE designer Worksheets. The output below DOES NOT show the imported data set in addition to the rule checks.

---

### Processing '01-Contact' Worksheet Check

*Data file display suppressed per user request for non-verbose output.  
(2 XML records found (include column header), 1 possible COBIE records were analyzed as below.)*

Column		Rule Description	Rule		
Letter	Name		Pass/Fail	Errors Found	Offending Records
A	ContactID	record ID's must be numeric	Pass	-	-
A	ContactID	record ID's must be increasing	Pass	-	-
A	ContactID	record ID's must be unique	Pass	-	-
B	ContactRole	Every contact must be identified by their role on the project	Pass	-	-
F	GivenName	The name of each contact must be provided (or n/a)	Pass	-	-
G	FamilyName	The name of each contact must be provided (or n/a)	Pass	-	-
G	FamilyName	People may not be listed more than once (unless updated)	Pass	-	-
H	OfficeName	The name of each contact's office must be provided.	Pass	-	-
K	AddressStreet	The street address for each contact's office must be provided (or n/a)	Pass	-	-

<http://127.0.0.1/report/cobie/> 7/21/2008

Validates Excel  
Workbook format

COBIE

# COBIE 07-Component Worksheet

BIM components organized by OmniClass

	A	B	C	F	G
	ComponentID	SpaceID	RegisterID	ComponentName	ComponentDescription
1	50	49	6	21 51 31 Plumbing--21 51 31 11 14 - Plumbing Fixtures	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:92322
51	50	6	49	21 51 31 Plumbing--21 51 31 11 14 - Plumbing Fixtures	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:92862
52	51	7	49	21 51 31 Plumbing--21 51 31 11 14 - Plumbing Fixtures	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:93402
53	52	6	50	21 51 31 Plumbing--21 51 31 11 14 - Plumbing Fixtures	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:92020
99	98	27	55	23 75 70 HVAC Distrib. Devices--23 75 70 21 24 Air terminal Units	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:92322
100	98	27	55	23 75 70 HVAC Distrib. Devices--23 75 70 21 24 Air terminal Units	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:92862
101	100	23	55	23 75 70 HVAC Distrib. Devices--23 75 70 21 24 Air terminal Units	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:93402
124	123	23	56	23 75 70 HVAC Distrib. Devices--23 75 70 14 34 Air Ducts Accessories	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:92020
125	124	31	56	23 75 70 HVAC Distrib. Devices--23 75 70 14 34 Air Ducts Accessories	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:92322
126	125	34	56	23 75 70 HVAC Distrib. Devices--23 75 70 14 34 Air Ducts Accessories	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:92862
146	145	24	57	23 75 70 HVAC Distrib. Devices--23 75 70 21 27 Air Outlets and Inlets	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:93402
147	146	24	57	23 75 70 HVAC Distrib. Devices--23 75 70 21 27 Air Outlets and Inlets	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:92020
148	147	24	57	23 75 70 HVAC Distrib. Devices--23 75 70 21 27 Air Outlets and Inlets	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:92322
181	180	7	57	23 75 70 HVAC Distrib. Devices--23 75 70 21 27 Air Outlets and Inlets	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:92862
332	331	27	58	23 60 30 General Pipework--23 60 30 11 00 CHWS	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:93402
333	332	23	58	23 60 30 General Pipework--23 60 30 11 00 CHWS	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:92020
334	333	23	58	23 60 30 General Pipework--23 60 30 11 00 CHWS	1,COBIE_Master.dgn,1 - First Floor;1,A-Floor_1.dgn,First Floor:92322
441	440	52	98	21 51 31 Plumbing--21 51 31 11 14 - Plumbing Fixtures	3,COBIE_Master.dgn,2 - Second Floor;2,M-Roof.dgn,2nd Model:135179
442	441	52	98	21 51 31 Plumbing--21 51 31 11 14 - Plumbing Fixtures	3,COBIE_Master.dgn,2 - Second Floor;2,M-Roof.dgn,2nd Model:171083
443	442	53	98	21 51 31 Plumbing--21 51 31 11 14 - Plumbing Fixtures	3,COBIE_Master.dgn,2 - Second Floor;2,M-Roof.dgn,2nd Model:169068
444	443	38	99	21 61 11 Equip. and Furnishings--21 61 11 21 61 Office Equip. & Furn.	3,COBIE_Master.dgn,2 - Second Floor;2,M-Roof.dgn,2nd Model:135179
445	444	38	100	21 61 11 Equip. and Furnishings--21 61 11 21 61 Office Equip. & Furn.	3,COBIE_Master.dgn,2 - Second Floor;2,M-Roof.dgn,2nd Model:171083
446	445	38	101	21 61 11 Equip. and Furnishings--21 61 11 21 61 Office Equip. & Furn.	3,COBIE_Master.dgn,2 - Second Floor;2,M-Roof.dgn,2nd Model:169068
458	457	70	113	23 75 70 HVAC Distrib. Devices--23 75 70 21 14 Coil Units	4,COBIE_Master.dgn,3 - Roof Floor;2,M-Roof.dgn,3D Model:135179
459	458	70	113	23 75 70 HVAC Distrib. Devices--23 75 70 21 14 Coil Units	4,COBIE_Master.dgn,3 - Roof Floor;2,M-Roof.dgn,3D Model:171083
460	459	70	113	23 75 70 HVAC Distrib. Devices--23 75 70 21 14 Coil Units	4,COBIE_Master.dgn,3 - Roof Floor;2,M-Roof.dgn,3D Model:169068
461	460	70	113	23 75 70 HVAC Distrib. Devices--23 75 70 21 14 Coil Units	4,COBIE_Master.dgn,3 - Roof Floor;2,M-Roof.dgn,3D Model:135179

Family: Duct  
Part: Supply-New  
Descr: Duct Supply Definition  
[MH-HVAC-SUPPLY-NEW]  
Render Mat:  
Group:

# Spatial Compliance Information Exchanges

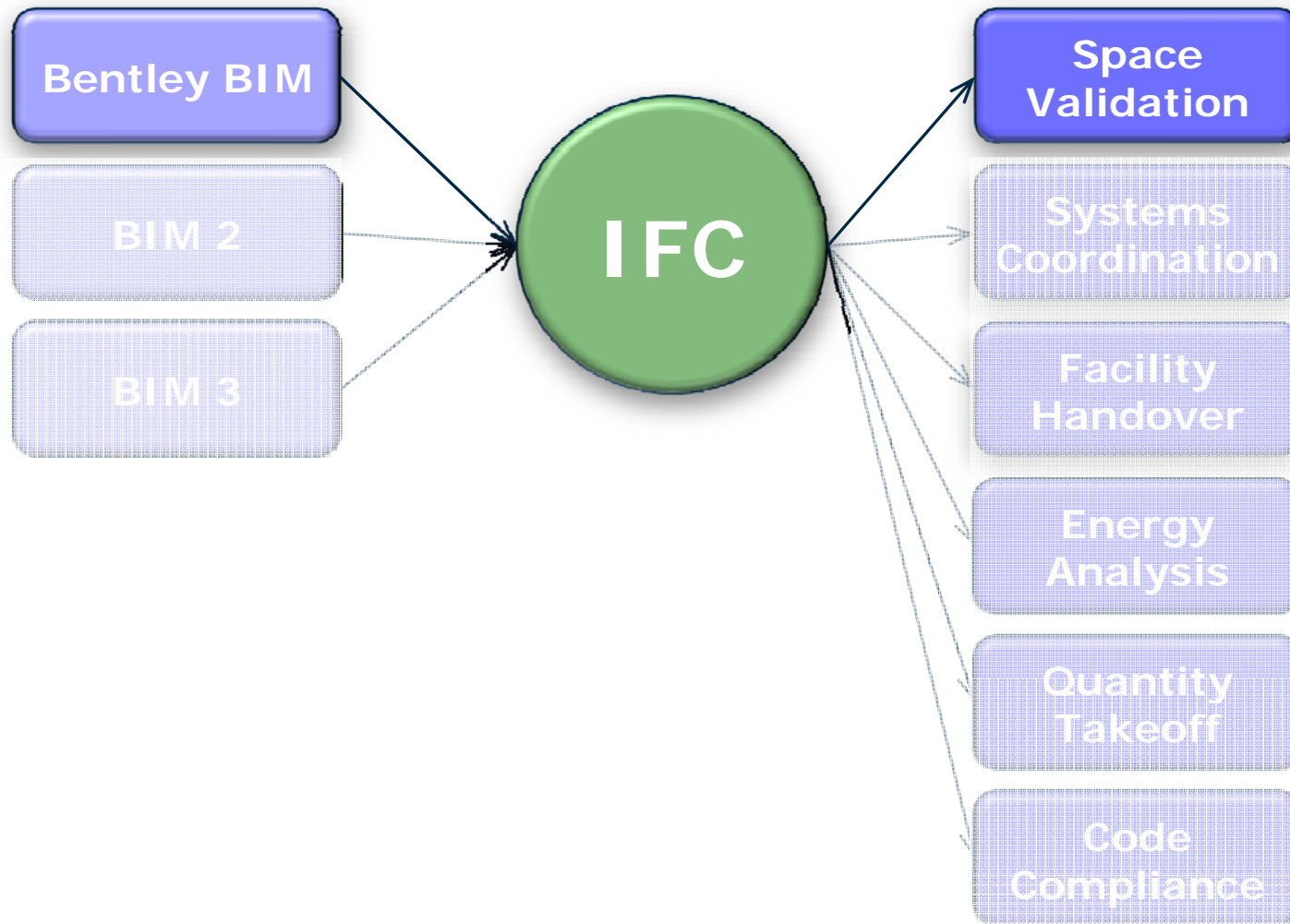
Thursday, July 24 (8 - 10am)



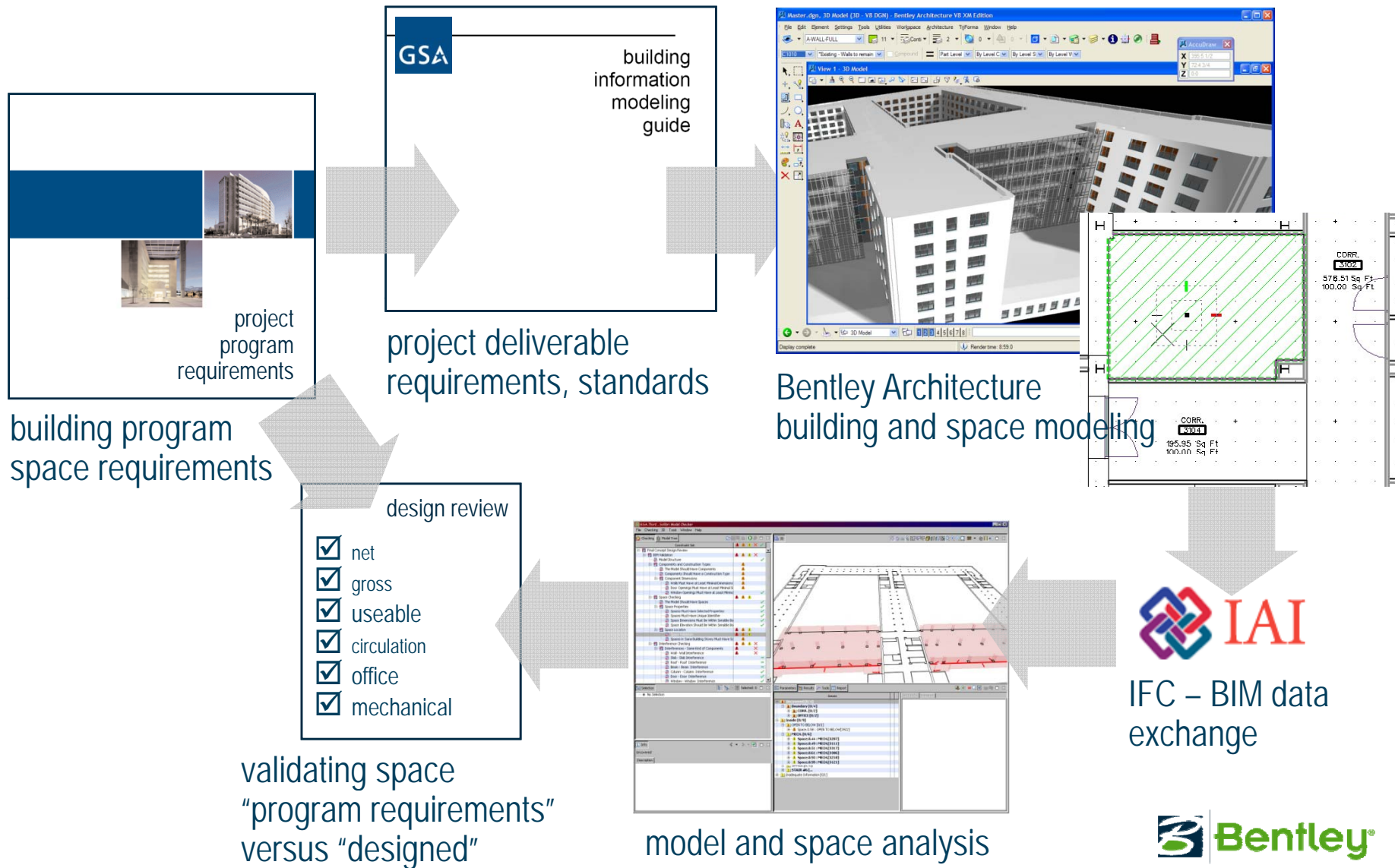
Thursday, 24 July 2008. 8:00am-10:30am  
Theme: Spatial Compliance Information Exchange

8:00am	Introduction, Summary and Agenda	Bill East
8:15am	Spatial Compliance Information Exchange (SCIE) <ul style="list-style-type: none"><li>- Business case</li><li>- Draft specifications</li></ul>	Bill East
8:45am	Verification of Spatial Compliance Information Exchanges <ul style="list-style-type: none"><li>- Definition of SCIE rules used to check</li><li>- Presentation of SCIE verification results</li></ul>	Nick Nisbet
9:15am	Presentations of design tools supporting SCIE <ul style="list-style-type: none"><li>- Autodesk</li><li>- Bentley</li><li>- Onuma</li></ul>	BIM Vendors

# BIM > Space Validation

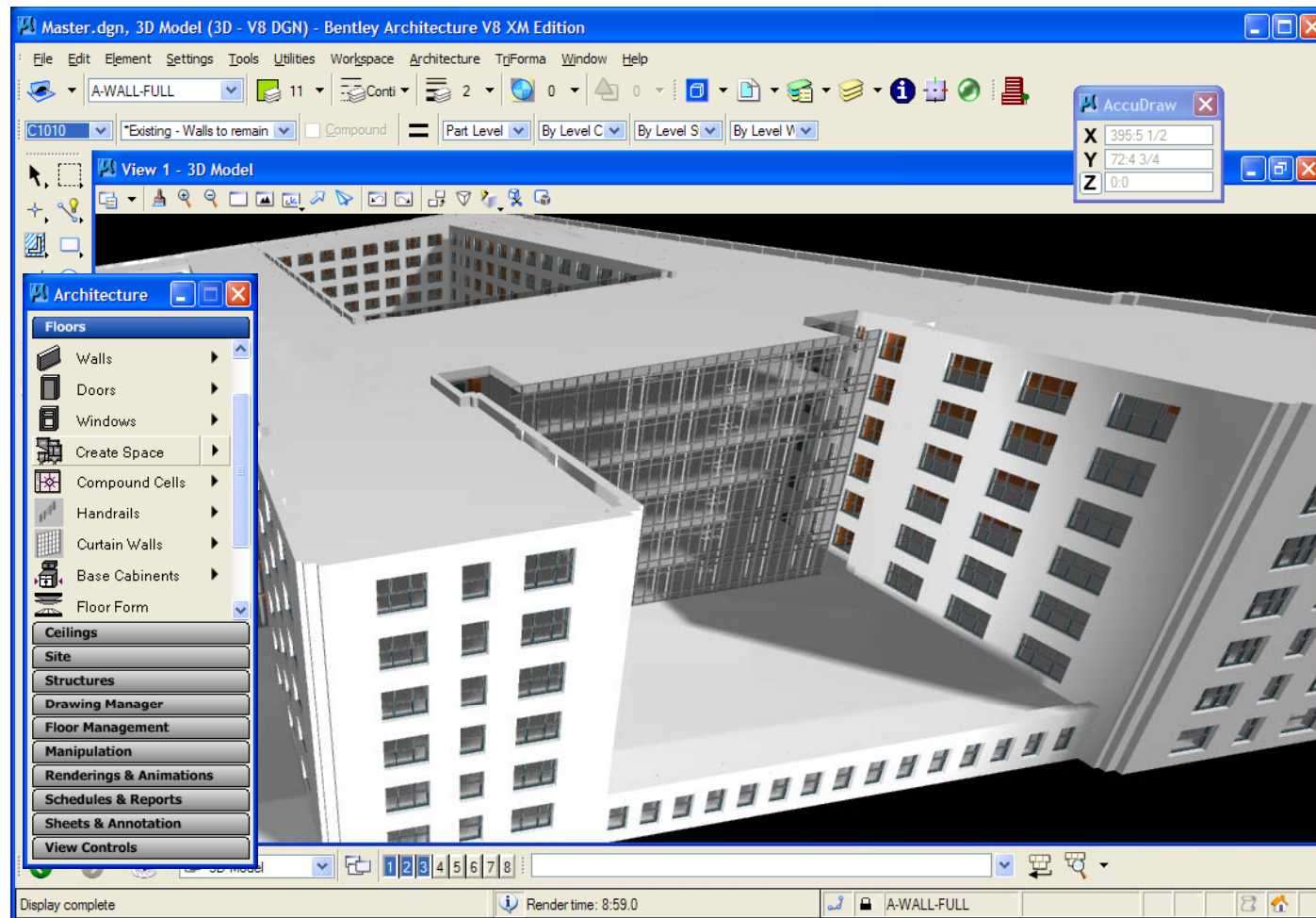


# GSA Building Program Space Validation



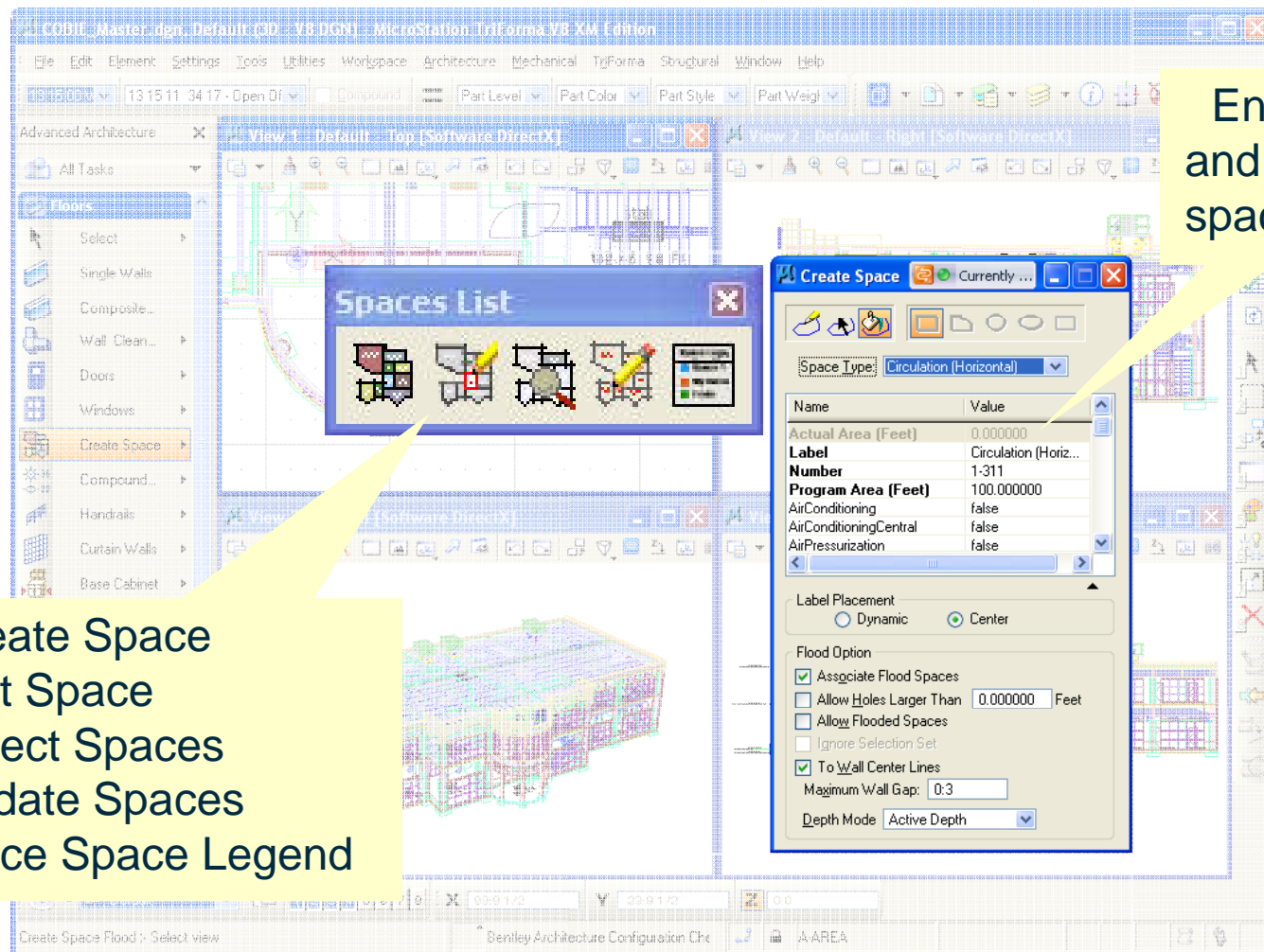


# GSA Building Program Spatial Validation





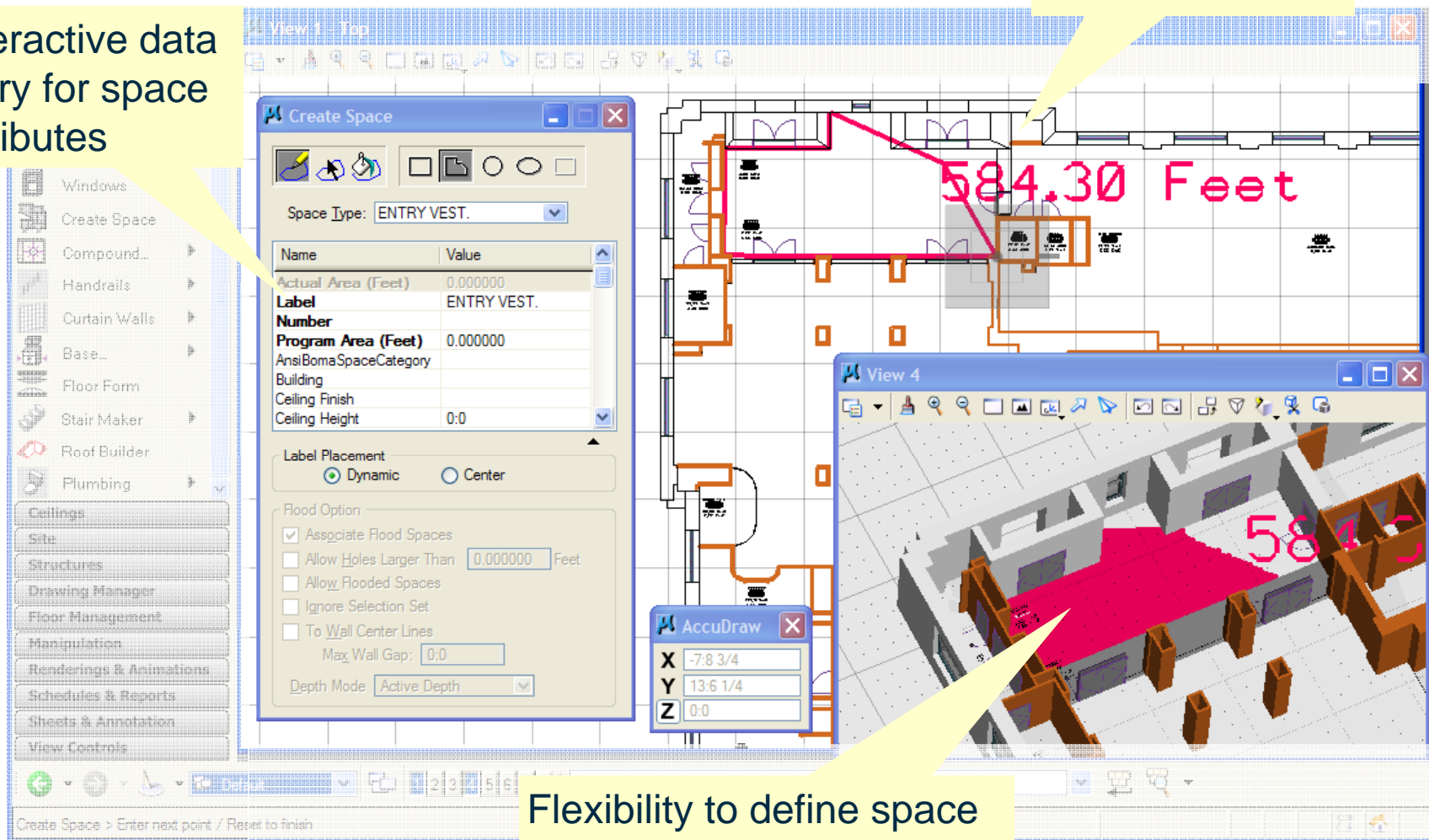
# Create and Manage Space



# Creating Spaces

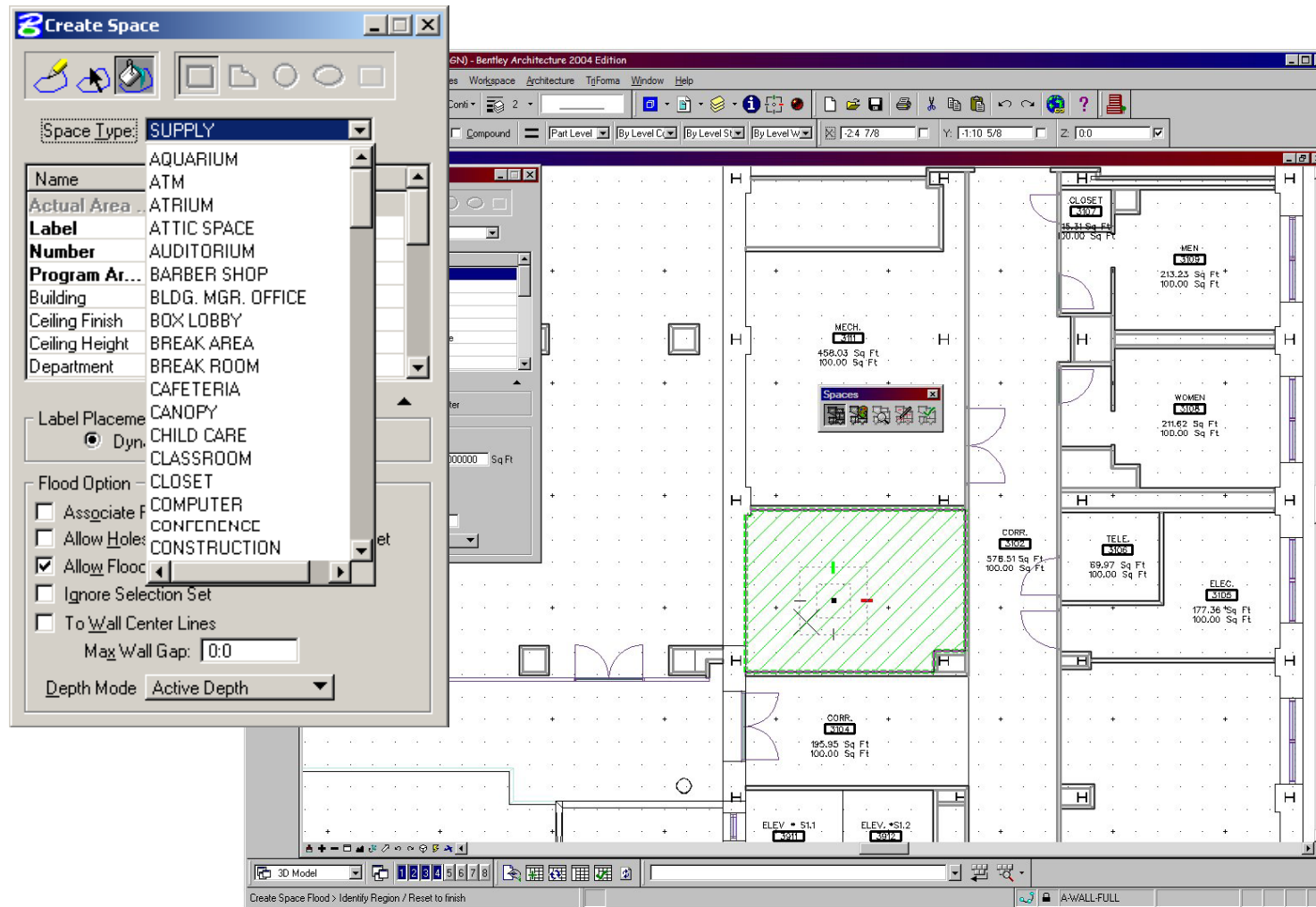
Interactive data entry for space attributes

Dynamic readout during drawing space boundary



Flexibility to define space using multiple views

# Create Space

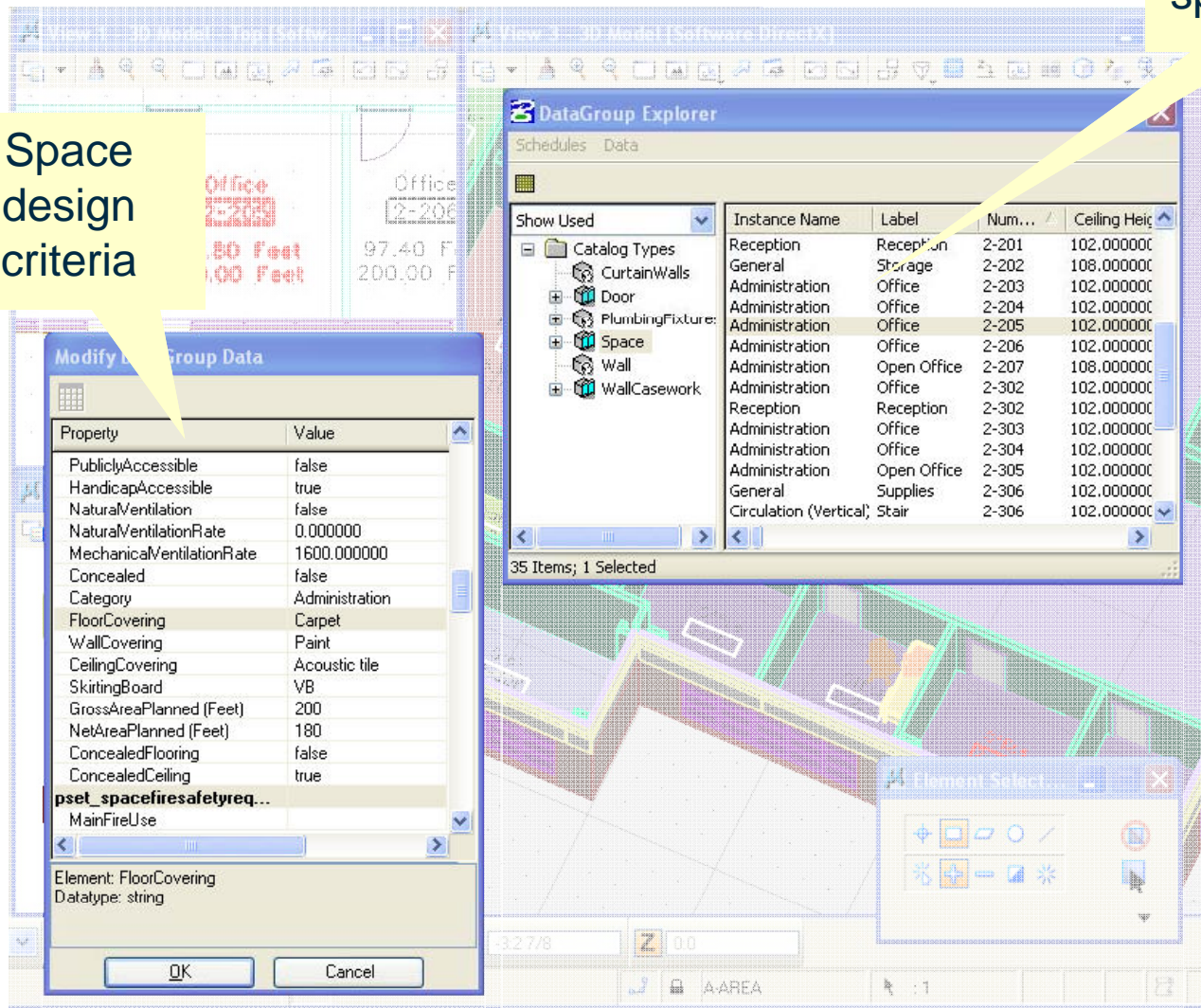




# Defining Space Requirements

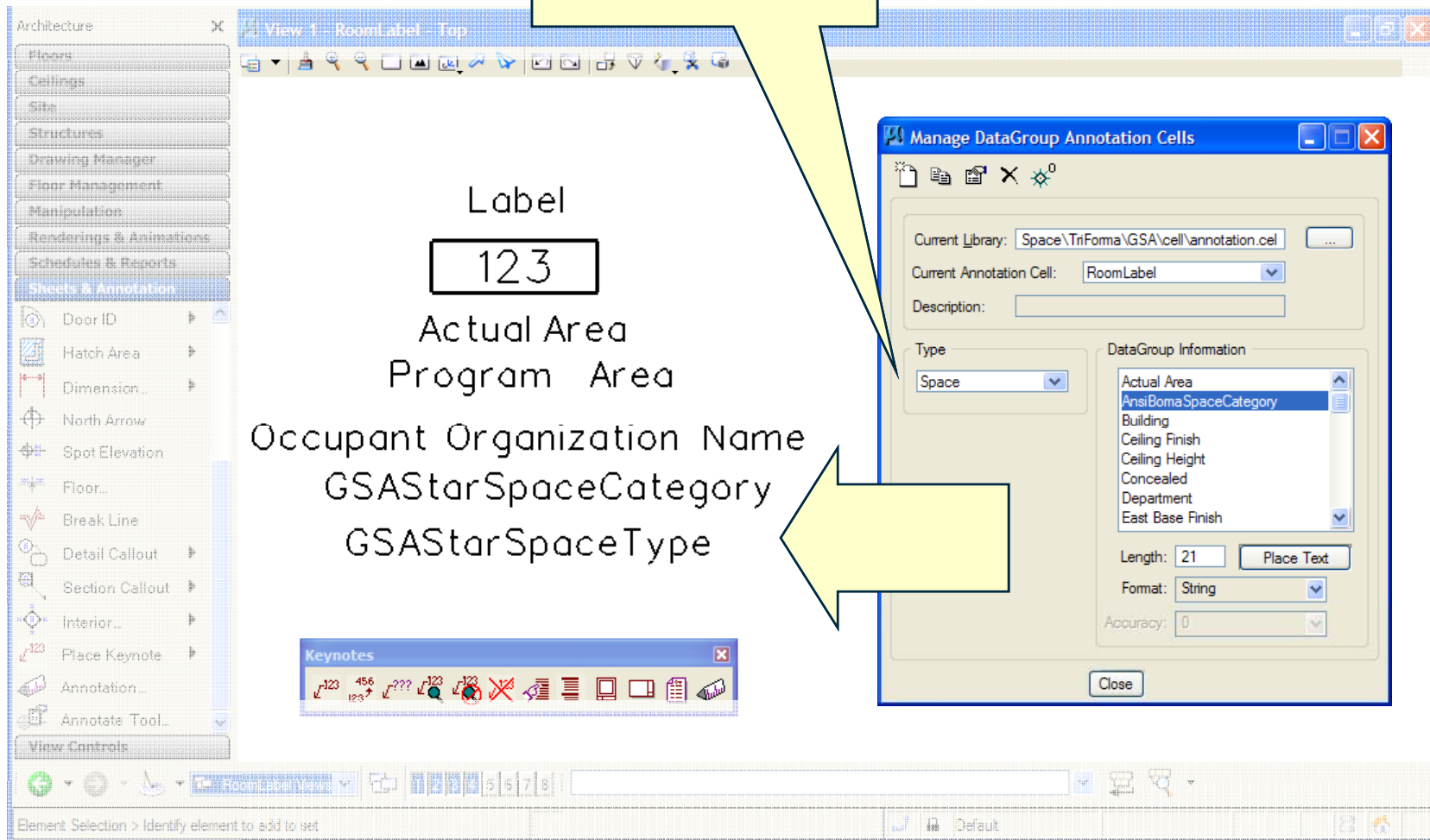
Managing  
space data

Space  
design  
criteria

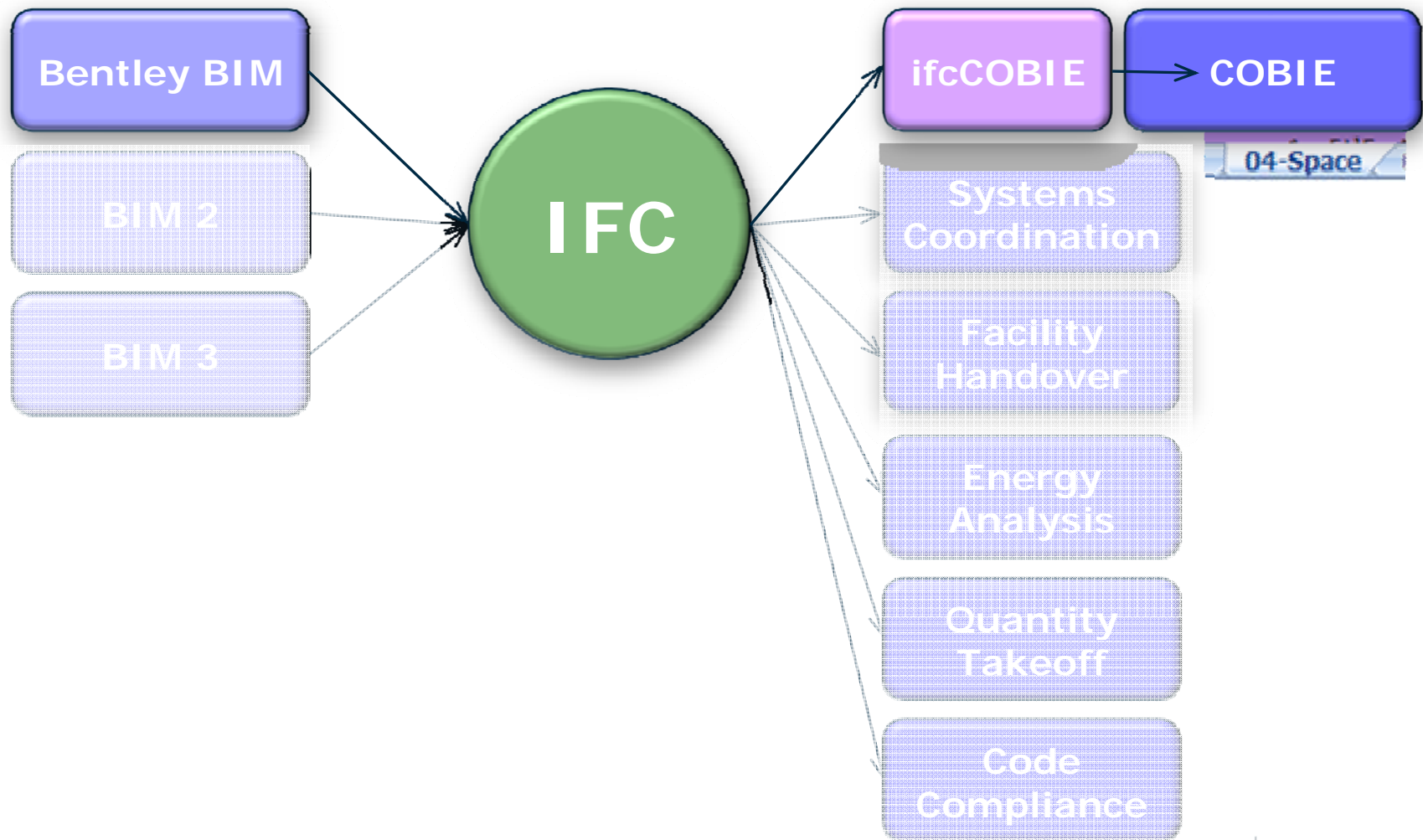


# Space Labels

Project control for  
labeling space with  
specific space  
attributes

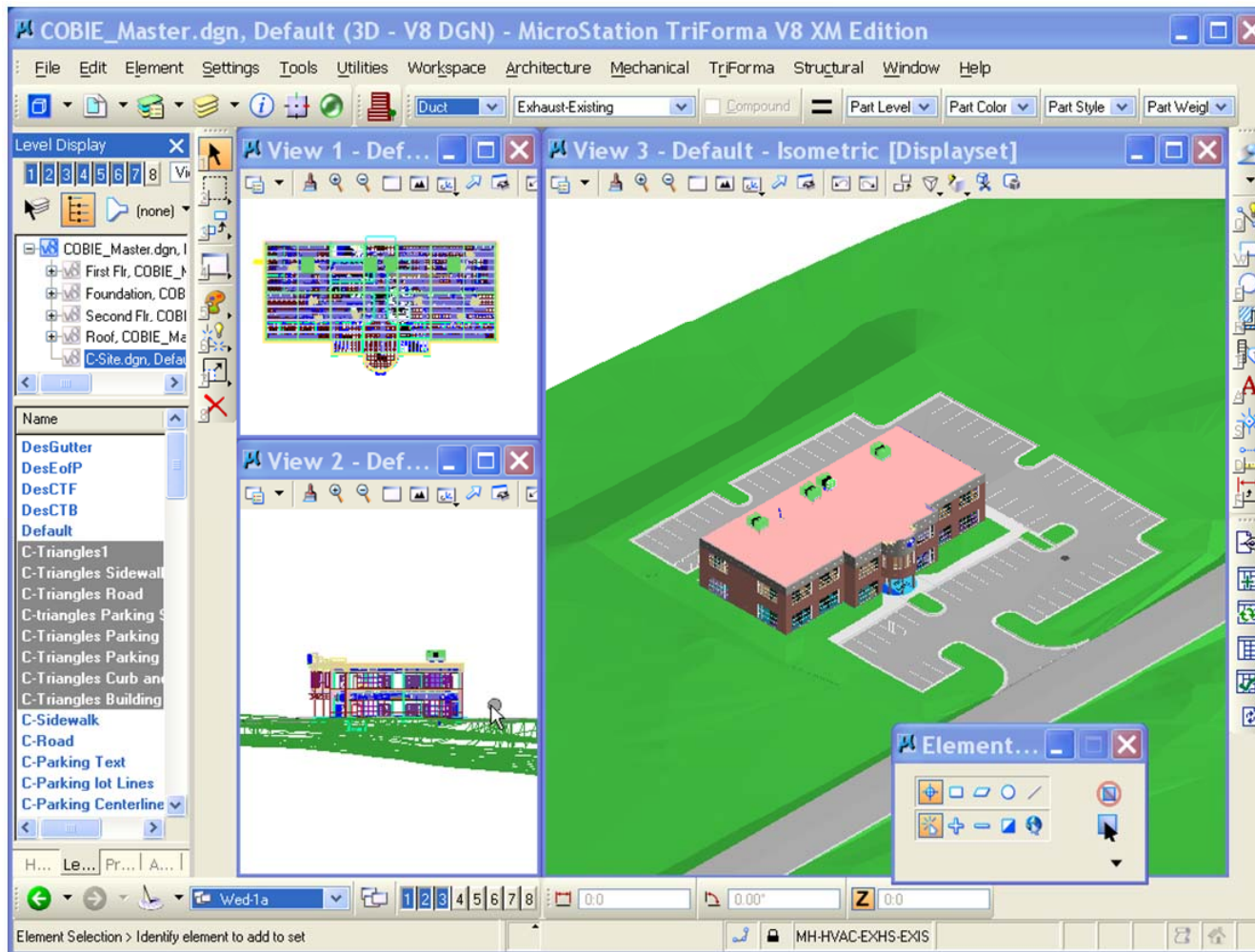


# BIM > IFC > ifcCOBIE > COBIE "Space"

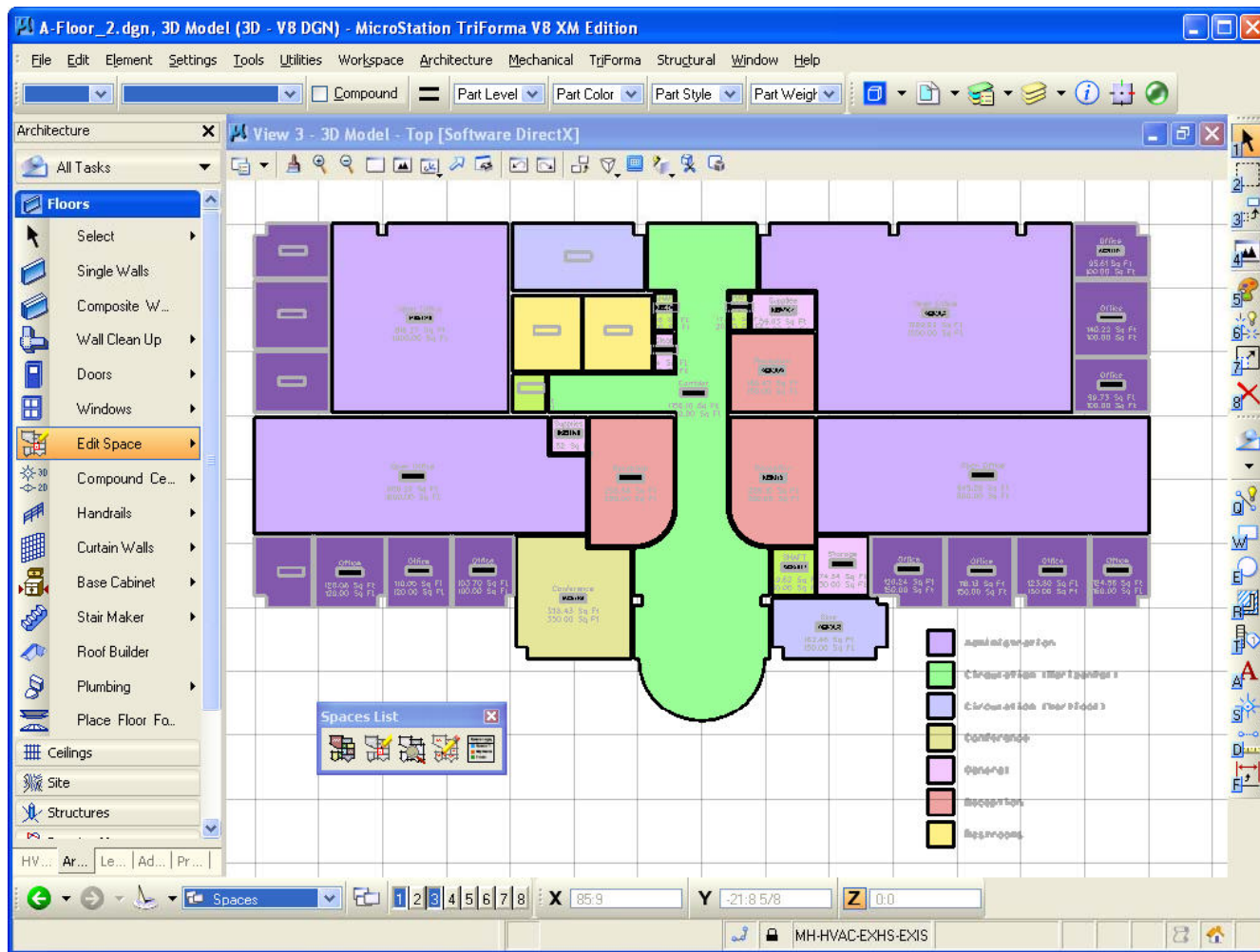




# BIM - Design and Managing Data

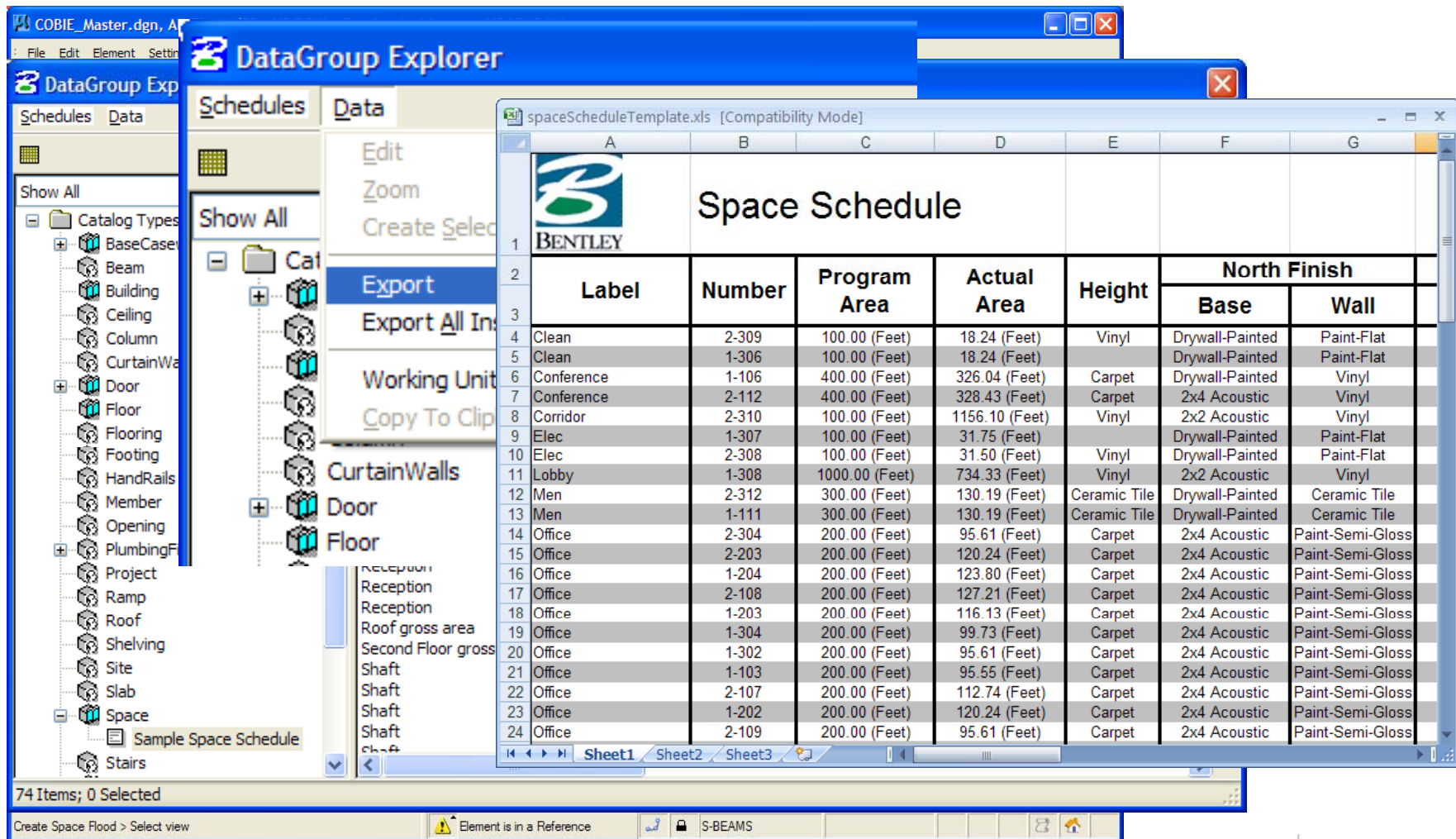


# Visualizing Space Definitions





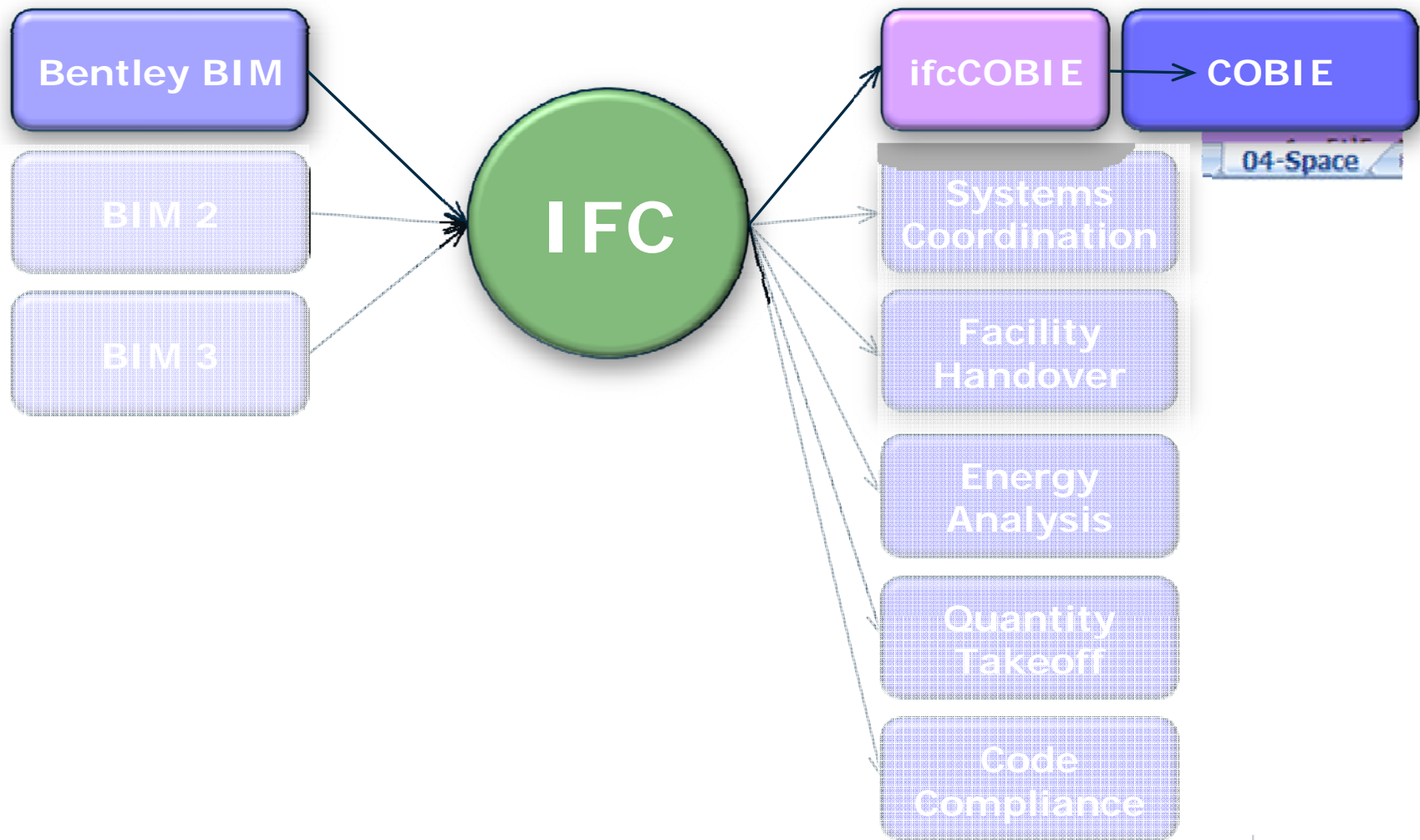
# Space Reports



The screenshot displays the Bentley DataGroup Explorer interface. The 'Schedules' tab is active, and a 'Space Schedule' report is open. The report is a table with columns for Label, Number, Program Area, Actual Area, Height, and North Finish (Base and Wall). The report lists 24 items, including Clean, Conference, Corridor, Elec, Lobby, Men, Office, Reception, Roof, Shaft, and Stairs. The report is titled 'Space Schedule' and includes the Bentley logo.

Label	Number	Program Area	Actual Area	Height	Base	Wall
Clean	2-309	100.00 (Feet)	18.24 (Feet)	Vinyl	Drywall-Painted	Paint-Flat
Clean	1-306	100.00 (Feet)	18.24 (Feet)	Vinyl	Drywall-Painted	Paint-Flat
Conference	1-106	400.00 (Feet)	326.04 (Feet)	Carpet	Drywall-Painted	Vinyl
Conference	2-112	400.00 (Feet)	328.43 (Feet)	Carpet	2x4 Acoustic	Vinyl
Corridor	2-310	100.00 (Feet)	1156.10 (Feet)	Vinyl	2x2 Acoustic	Vinyl
Elec	1-307	100.00 (Feet)	31.75 (Feet)	Vinyl	Drywall-Painted	Paint-Flat
Elec	2-308	100.00 (Feet)	31.50 (Feet)	Vinyl	Drywall-Painted	Paint-Flat
Lobby	1-308	1000.00 (Feet)	734.33 (Feet)	Vinyl	2x2 Acoustic	Vinyl
Men	2-312	300.00 (Feet)	130.19 (Feet)	Ceramic Tile	Drywall-Painted	Ceramic Tile
Men	1-111	300.00 (Feet)	130.19 (Feet)	Ceramic Tile	Drywall-Painted	Ceramic Tile
Office	2-304	200.00 (Feet)	95.61 (Feet)	Carpet	2x4 Acoustic	Paint-Semi-Gloss
Office	2-203	200.00 (Feet)	120.24 (Feet)	Carpet	2x4 Acoustic	Paint-Semi-Gloss
Office	1-204	200.00 (Feet)	123.80 (Feet)	Carpet	2x4 Acoustic	Paint-Semi-Gloss
Office	2-108	200.00 (Feet)	127.21 (Feet)	Carpet	2x4 Acoustic	Paint-Semi-Gloss
Office	1-203	200.00 (Feet)	116.13 (Feet)	Carpet	2x4 Acoustic	Paint-Semi-Gloss
Office	1-304	200.00 (Feet)	99.73 (Feet)	Carpet	2x4 Acoustic	Paint-Semi-Gloss
Office	1-302	200.00 (Feet)	95.61 (Feet)	Carpet	2x4 Acoustic	Paint-Semi-Gloss
Office	1-103	200.00 (Feet)	95.55 (Feet)	Carpet	2x4 Acoustic	Paint-Semi-Gloss
Office	2-107	200.00 (Feet)	112.74 (Feet)	Carpet	2x4 Acoustic	Paint-Semi-Gloss
Office	1-202	200.00 (Feet)	120.24 (Feet)	Carpet	2x4 Acoustic	Paint-Semi-Gloss
Office	2-109	200.00 (Feet)	95.61 (Feet)	Carpet	2x4 Acoustic	Paint-Semi-Gloss

# BIM > IFC > ifcCOBIE > COBIE



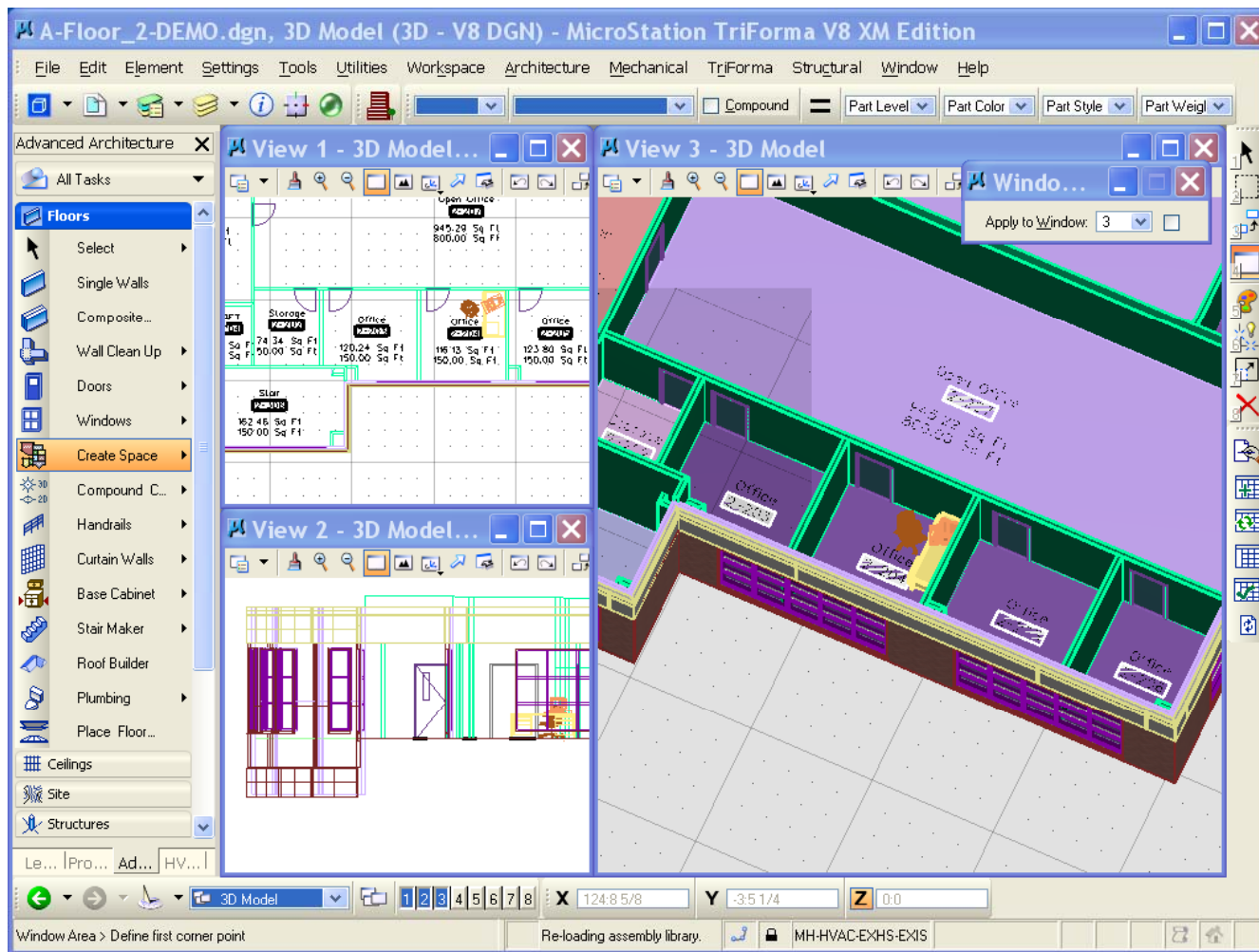
# COBIE 04-Space Worksheet

	A	B	C	G	H	I	N	O	P	Q
1	SpaceID	FloorID	SpaceFunction	SpaceNumber	SpaceName	SpaceDescription	InteriorGrossArea	InteriorGrossAreaUnit	Plannab	Plannab
2	1	1,First Flr	Reception	1-107	1-107	Reception	24.019405	squaremeters	27.870912	squaremeters
3	2	1,First Flr	Circulation (Vertical)	1-110	1-110	Stair	19.777899	squaremeters	18.580608	squaremeters
4	3	1,First Flr	Circulation (Vertical)	1-208	1-208	Stair	15.121583	squaremeters	13.935456	squaremeters
5	4	1,First Flr	Conference	1-106	1-106	Conference	30.290247	squaremeters	32.516064	squaremeters
6	5	1,First Flr	General	1-307	1-307	Elec	2.950049	squaremeters	4.645152	squaremeters
7	6	1,First Flr	Restrooms	1-112	1-112	Women	12.141			
8	7	1,First Flr	Restrooms	1-111	1-111	Men	12.094			
9	8	1,First Flr	Reception	1-301	1-301	Reception	15.368			
10	9	1,First Flr	Reception	1-201	1-201	Reception	23.978			
11	10	1,First Flr	Mechanical	1-401	1-401	Shaft	1.6838			
12	11	1,First Flr	Mechanical	1-403	1-403	Shaft	4.6388			
13	12	1,First Flr	Mechanical	1-402	1-402	Shaft	1.6714			
14	13	1,First Flr	General	1-113	1-113	Supplies	2.9286			
15	14	1,First Flr	General	1-307	1-307	Supplies	5.5606			
16	15	1,First Flr	General	1-306	1-306	Clean	1.6945			
17	16	1,First Flr	Storage	1-207	1-207	Supplies	6.9065			
18	17	1,First Flr	Circulation (Horizontal)	2-309	2-309	Lobby	24.324			
19	18	1,First Flr	Circulation (Horizontal)	2-310	2-310	Lobby	22.153			
20	19	1,First Flr	Lobby	1-308	1-308	Lobby	68.221			
21	20	1,First Flr	Administration	1-203	1-203	Office	10.788			
22	21	1,First Flr	Administration	1-108	1-108	Open Office	84.475			
23	22	1,First Flr	Administration	1-104	1-104	Office	10.272			
24	23	1,First Flr	Administration	1-206	1-206	Open Office	87.820			

Space schedule from BIM

Information 01-Contact 02-Facility 03-Floor 04-Space 05-System 06-R

# BIM - Managing Space



# Coordination View Information Exchange

Thursday, July 24 (11am - 1pm)

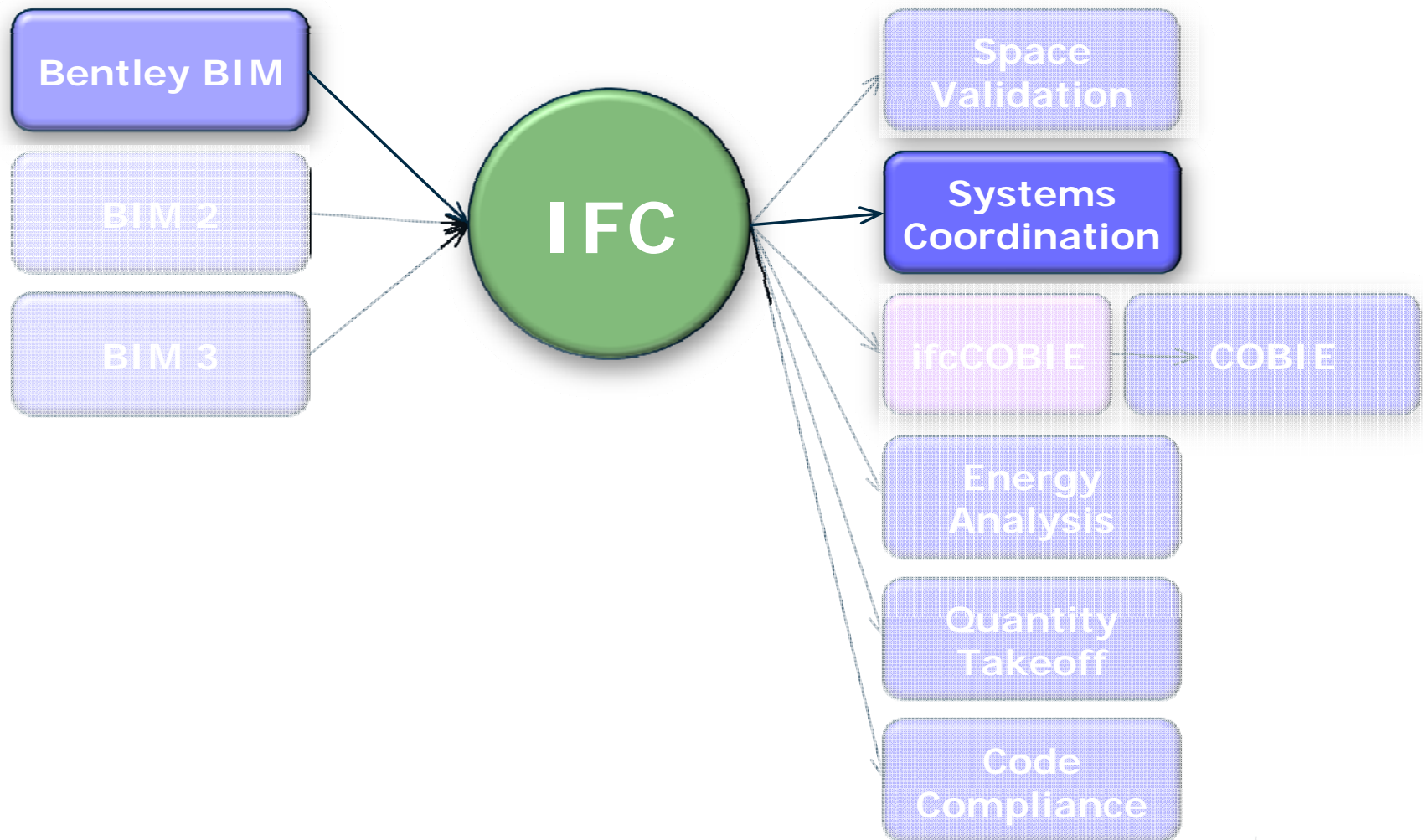


Thursday, 24 July 2008. 10:30am-1:00pm  
Theme: Coordination View Information Exchange

10:30am	Presentation: Coordination View Information Exchange (CVIE) <ul style="list-style-type: none"><li>- Business case</li><li>- Draft specifications</li></ul>	Bill East
10:45am	Formal requirements: Definition of CVIE compliance rules <ul style="list-style-type: none"><li>- Design Coordination</li><li>- Operability Review</li></ul>	Nick Nisbet
11:00am	Demonstrations of clash detection <ul style="list-style-type: none"><li>- Bentley</li><li>- Autodesk</li><li>- Solibri</li></ul>	BIM Vendors
12:30pm	Review of Validation reports for CVIE compliance	Nick Nisbet
12:45pm	3 <sup>rd</sup> party Service Providers/consultants	
1:00pm	Lunch	

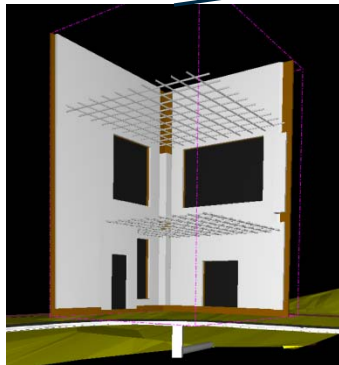
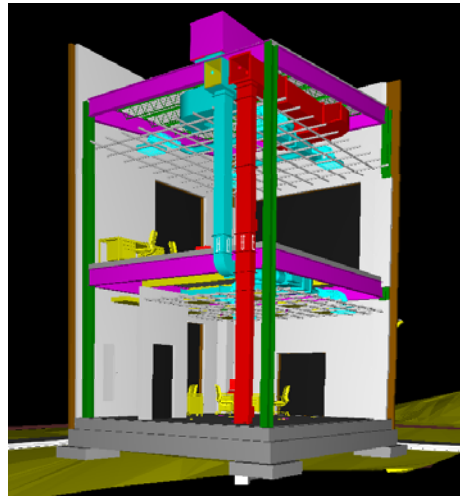


# BIM > IFC > Clash Detection

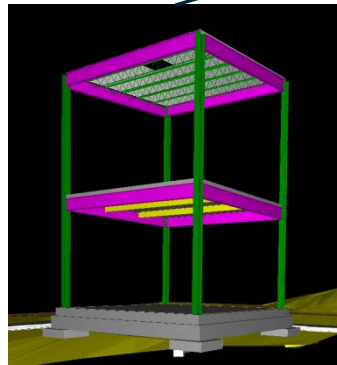


# Multidisciplinary BIM Collaboration

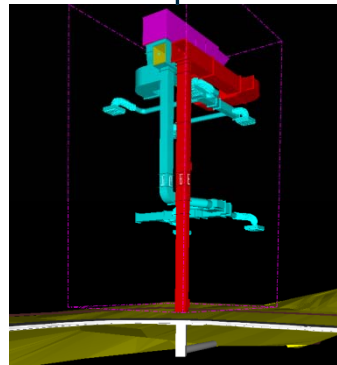
Bentley BIM



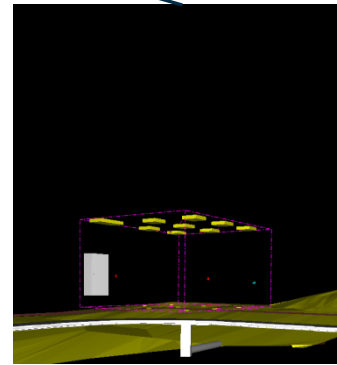
ARCH



STRUCT



MECH



ELEC



FM

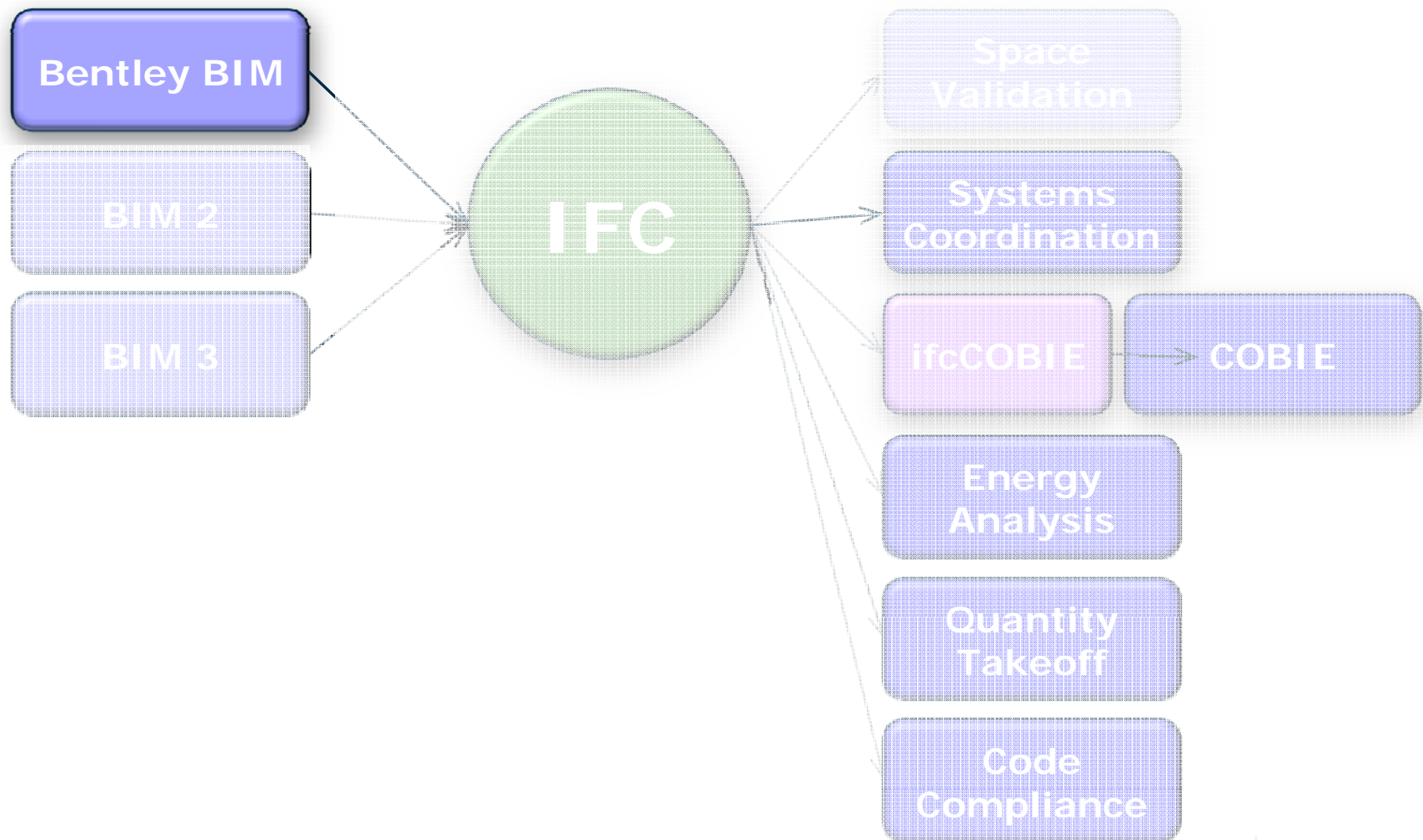




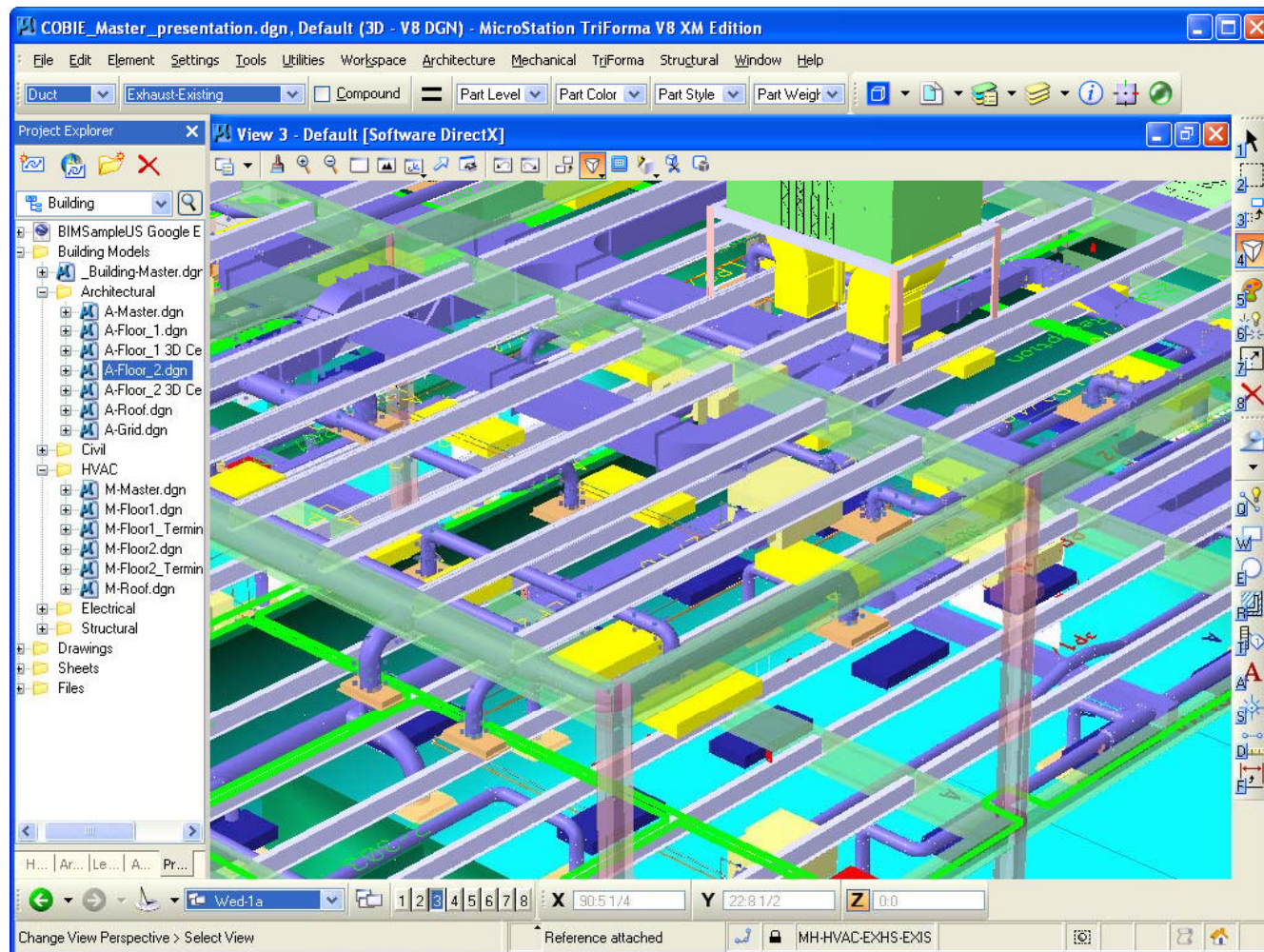
## Workflow – levels of collaboration

- “Designer” clash detection
  - individual discipline to others, designer can resolve
- “Team” clash detection
  - multidisciplinary, requires help from others
- “Project” clash detection
  - data aggregated from many design sources (not all data from the same BIM authoring platform)

# BIM (multidisciplinary)



# BIM (Arch, Struct, Mech, Elec)



# “Designer” Clash Detection

User = Design Architect/Engineer

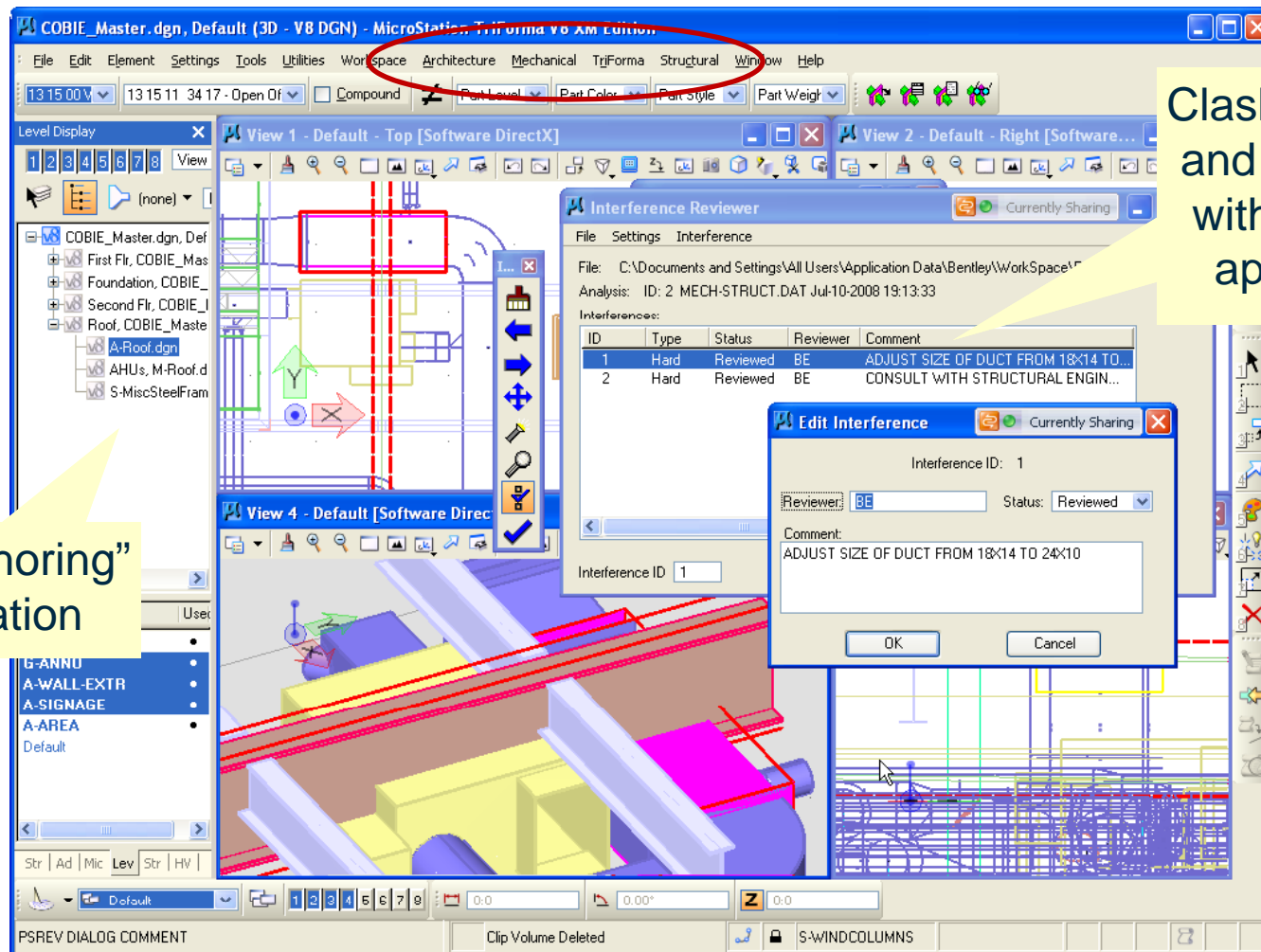
## Benefits

- Identify design issues during natural design process
- Provides opportunity for issue to be resolved by designer before promoting to project team
- Early identification of issue
- Non-disruptive workflow



# “Designer” – BIM Design Suite

BIM “authoring” application



Clash detection and resolution within design application



# **“Team” Clash Detection**

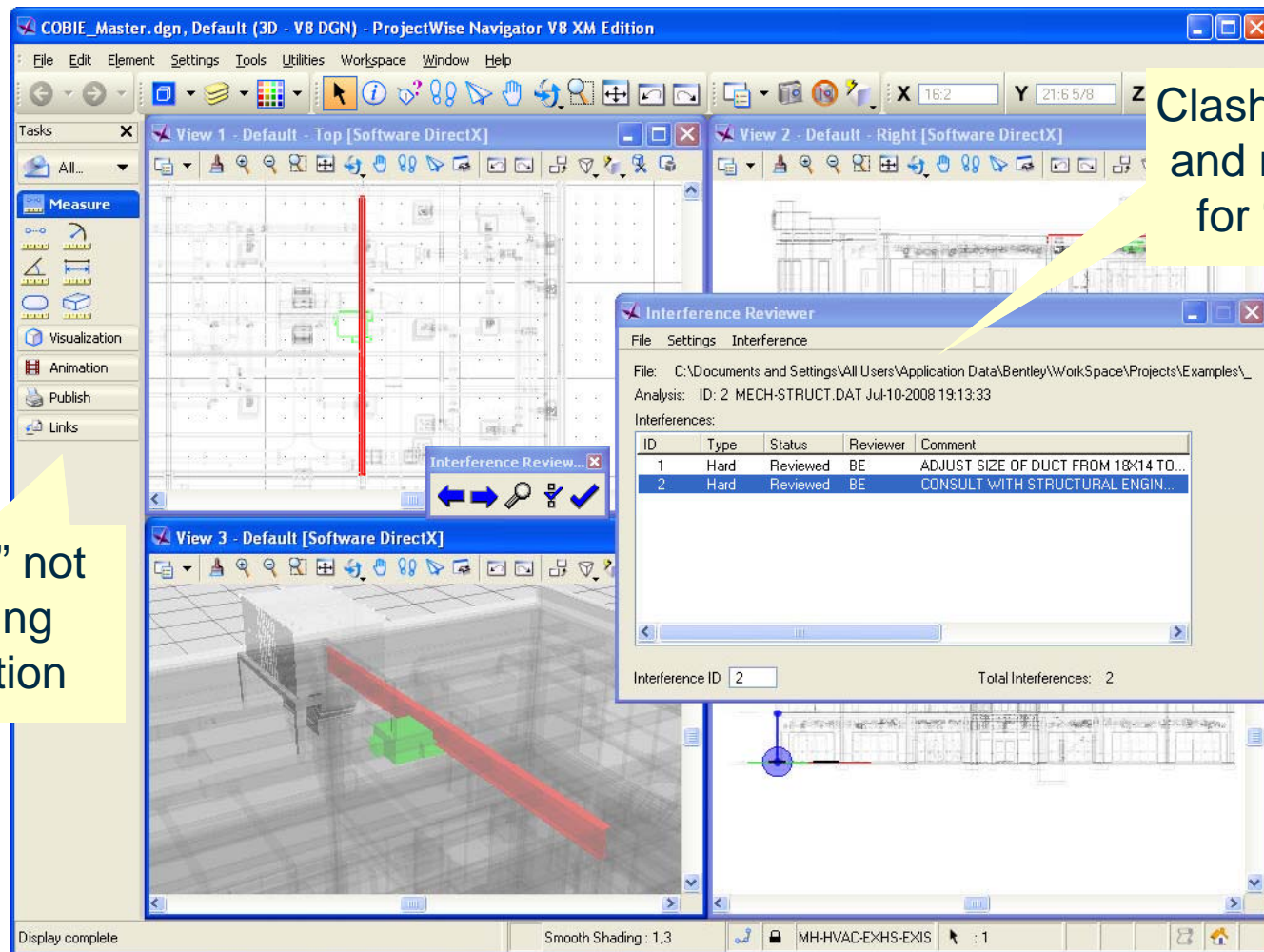
User = Project Manager, Design Team Leader

## Benefits

- Easy to use BIM “review” tool
- Aggregate data beyond immediate team
- Resolve issues between design disciplines
- Save time, no translation of data required (all data same BIM format/platform)



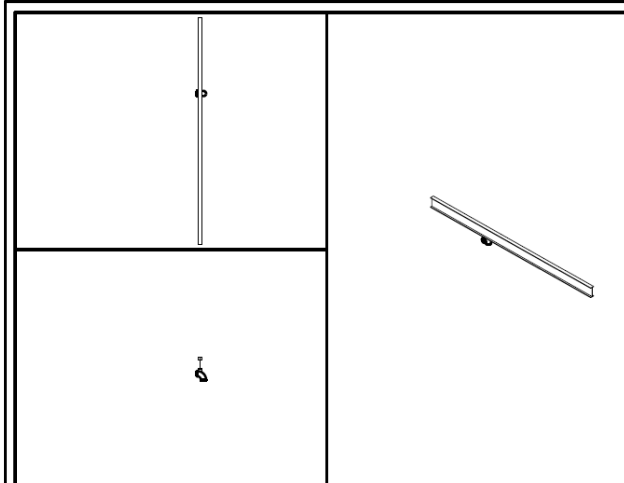
# "Team" - ProjectWise Navigator



# Clash Detection Report

BuildingSmart SCIE Demo

Bentley Systems Inc.



## Object #1 Information

App =  
Form Type =  
ID =  
Part = 21 41 31 11 21 - Structural Floors Girders  
Family = 21 41 31 Superstruct. and Encl.

## Object #2 Information

## Interference Information

Number = 83  
Type = Soft  
Status = Detected  
Point = X - 138'-7 1/2", Y - 49'-3 9/16", Z - 25'-9 9/16"  
Object 1 Commodity =  
Object 2 Commodity =  
Object 1 File = ...jects\*Examples\*\_COBIE\*Files\*S-SteelFraming-02.jsm  
Object 2 File = ...Space\*Projects\*Examples\*\_COBIE\*Files\*M-Floor2.jsm  
Date First Detected = Jul-21-2008 18:32:28  
Last Date Detected = Jul-21-2008 22:08:22  
Reviewer =  
Comment =

C:\*Documents and Settings\*All Users\*Application Data\*Bentley\*WorkSpace\*Projects\*Examples\*\_COBIE\*Files\*BENTLEY\_SCIE\_soft.IOF





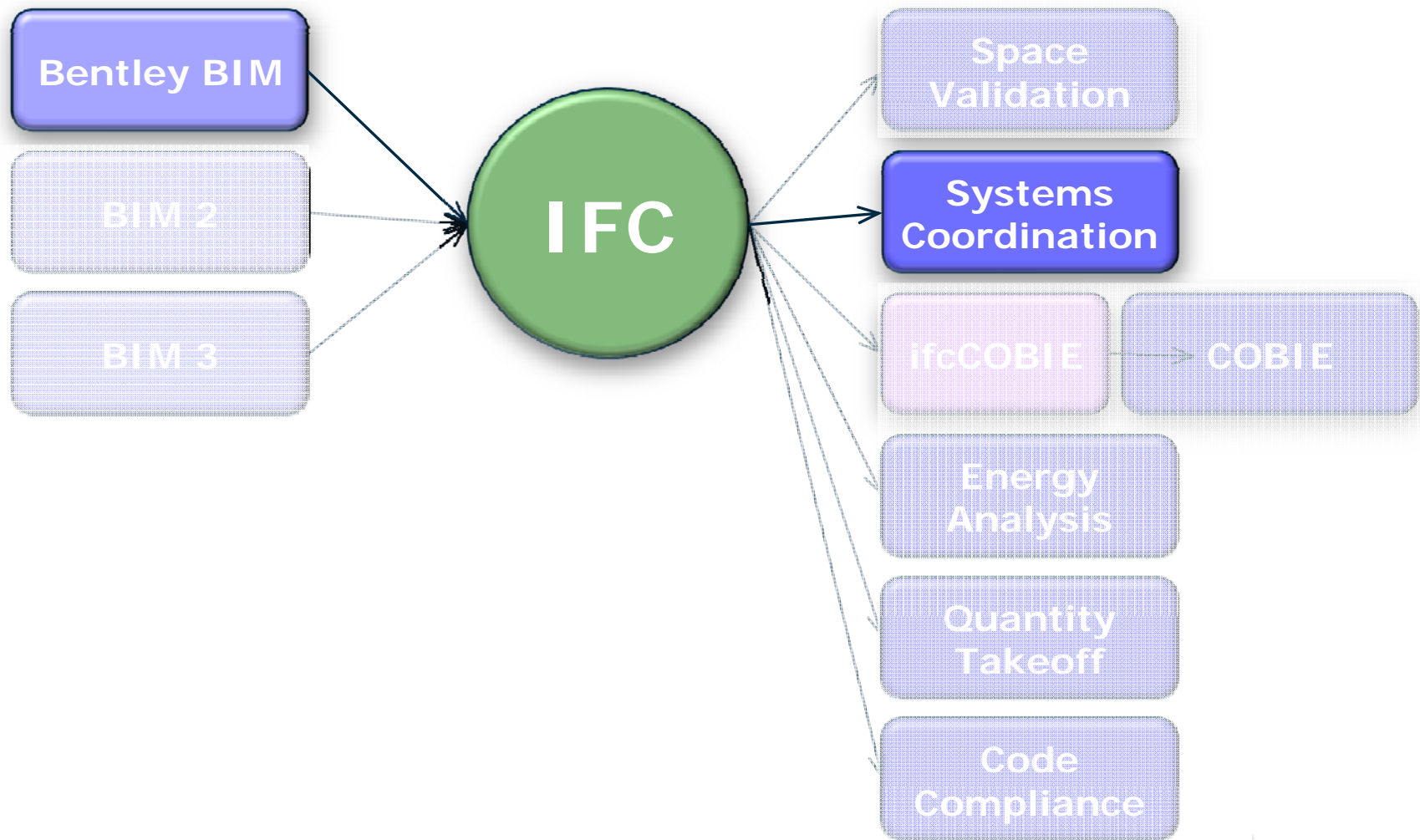
# "Project" Clash Detection

User = Independent Consultant, Owner

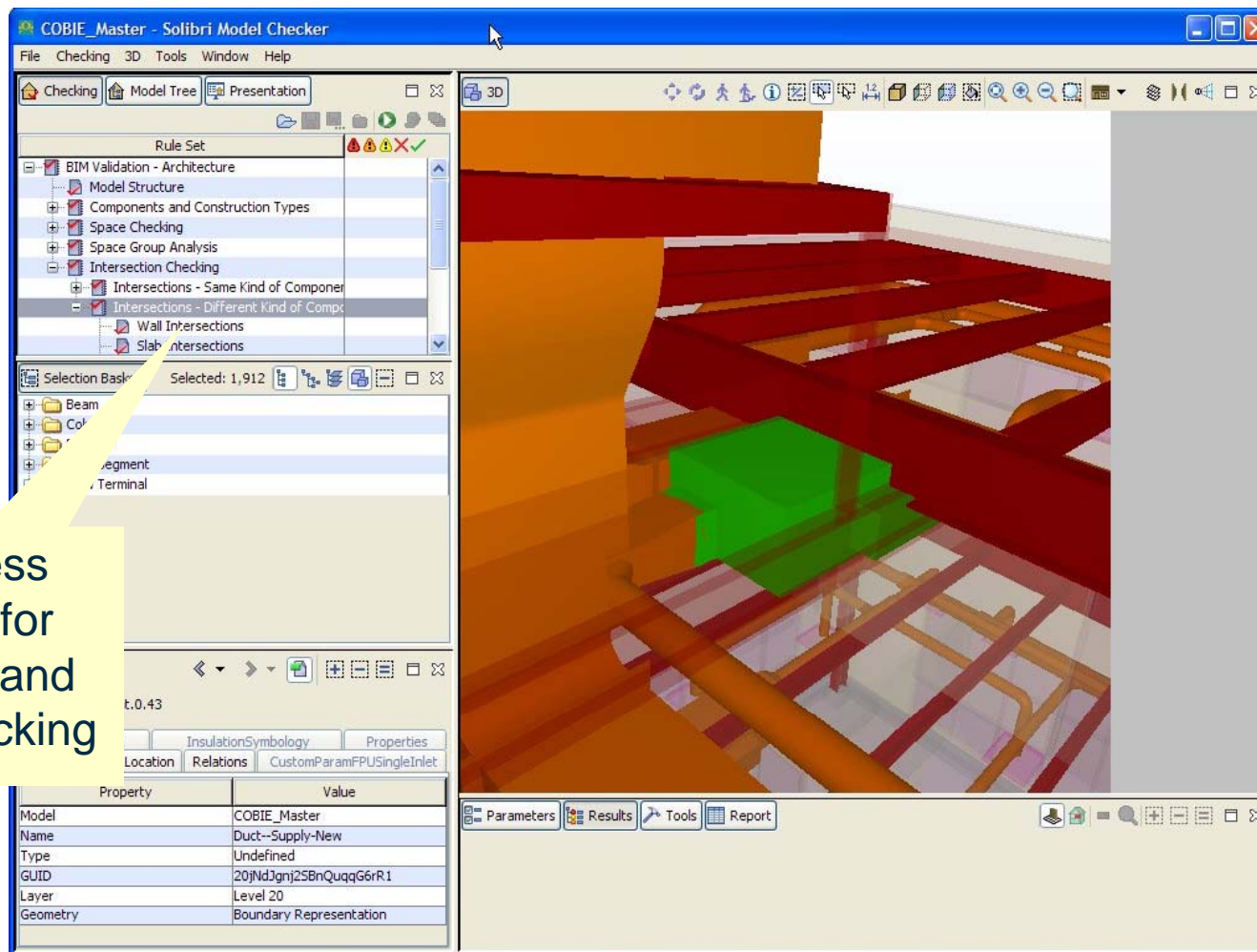
## Benefits

- Aggregate data from multiple design sources (data from multiple BIM formats)

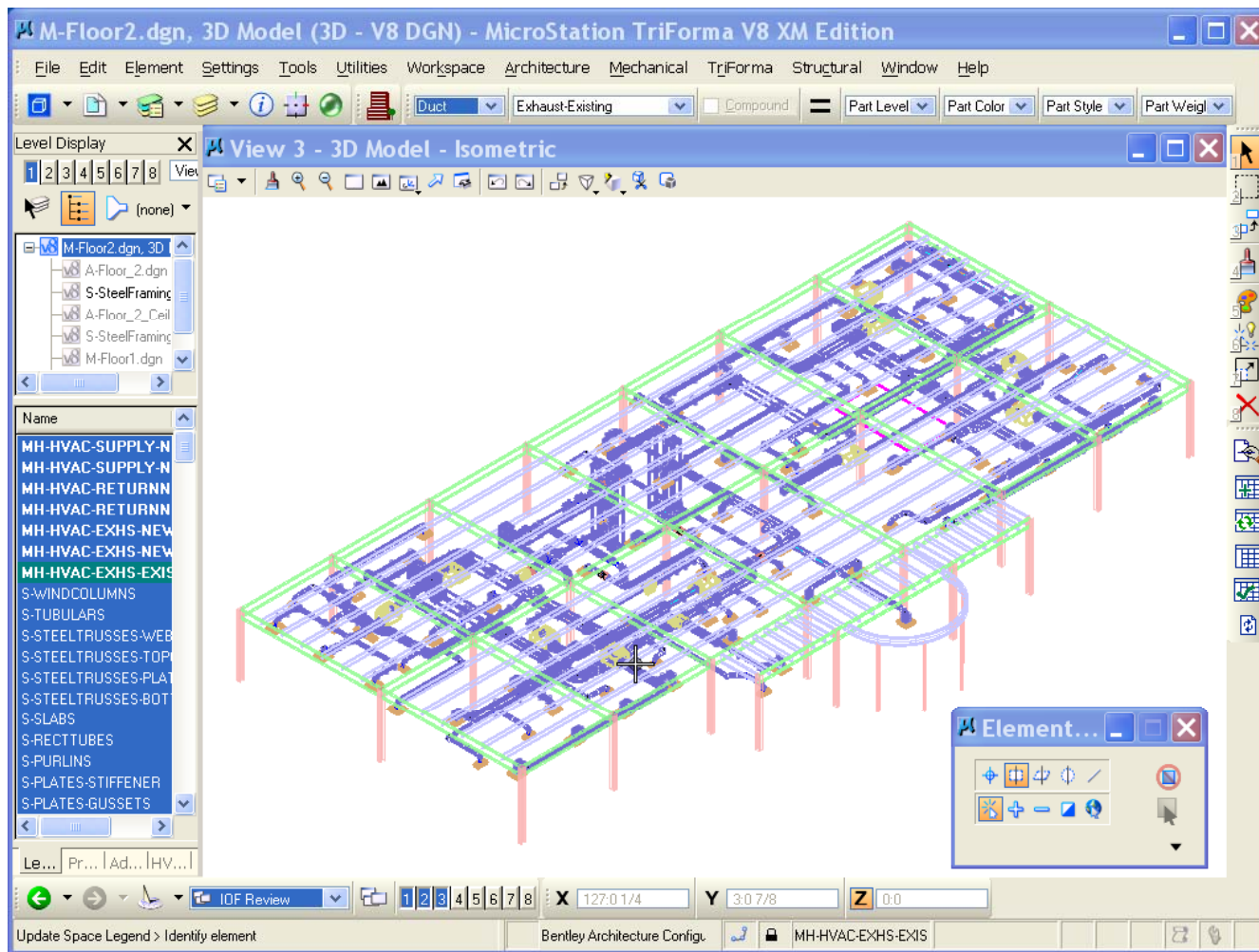
# BIM > IFC > "Project" Clash Detection



# Bentley BIM > IFC > Solibri Model Checker



# Design Clash Detection



# Construction Operations Building Information Exchanges

Thursday, July 24 (2 - 5pm)



Thursday, 24 July 2008. 2:00pm-5:00pm

## Theme: Construction-Operations Building Information Exchange

2:30pm	Introductions and reprise of previous sessions	Bill East
	- Introduction to COBIE	Bill East
	- Business case	
	- Draft specifications	
2:45pm	COBIE Designer Data Pilot Test	Bill East
3:00pm	Break	
3:30pm	Demonstration of mapping and formal requirements	Nick Nisbet
	- IFC to COBIE spreadsheet	
	- COBIE spreadsheet to IFC	
	- Definition of COBIE compliance rules	
	- Translator software	
4:15pm	3 <sup>rd</sup> party Service Providers/Consultants	
4:30pm	Recap of BIM Vendor implementation of COBIE	
5:00pm	Adjourn	

# Construction Operations Building Information Exchanges

Friday, July 24 (8am - 1pm)



Friday, 25 July 2008. 8:00am-1:00pm

## Theme: Construction-Operations Building Information Exchange

8:00pm	Introduction to COBIE - Business case: Maintenance management and federal agencies - Design stage requirements - Operational and Asset management requirements	Bill East
8:30am	USACE Strategic Plan for Adoption of Open BIM Standards - Major General Merdith W. B. (Bo) Temple - Deputy Commanding General, Military and International Operations	
9:00am	Formal requirements - Definition of COBIE compliance rules.	Nick Nisbet
9:30am	Break	
10:00am	Demonstration of mapping - IFC to COBIE spreadsheet - COBIE spreadsheet to IFC	Nick Nisbet
10:20am	CMMS Vendor Challenge (Attachment 2) - IBM Maximo - Project Blueprint - TMA	Nick Nisbet
12:30pm	Attendee discussion	All
12.45pm	Conclusion: Follow-up and actions	Bill East
1.00pm	Close	





## Attachment 2 - CMMS Vendors Challenge Description

CMMS vendors will have already selected a model for demonstration and produced their COBIE file that was evaluated prior to the meeting.

- (1) Vendors may start by showing (live)
  - a. A manually produced COBIE spreadsheet
  - b. A COBIE spreadsheet produced by a BIM vendor
  - c. An IFC model produced by a BIM vendor
- (2) The COBIE-IFC application or IFC-COBIE application may be used (using pre-processed file)
- (3) Vendor will demonstrate the import process highlighting (live)
  - a. Modules or options used
  - b. Any pre-configuration required
- (4) Vendor will review the imported data to show (live)
  - a. Spatial hierarchy
  - b. Component/Asset/Equipment/Type lists
- (5) Vendors should demonstrate other aspects of the application such as develop a work order, serviced request or other report (live)

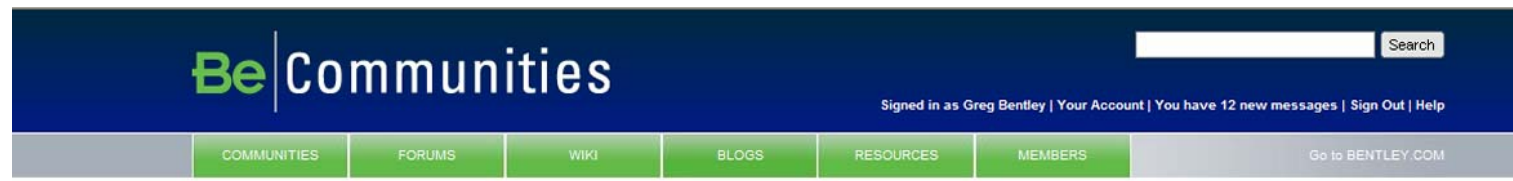
# About Bentley

Bentley is the global leader dedicated to providing comprehensive software solutions for sustaining infrastructure. Architects, engineers, constructors, and owner-operators are indispensable in improving our world and our quality of life; the company's mission is to improve the performance of their projects and of the assets they design, build, and operate. Bentley sustains the infrastructure professions by helping to leverage information technology, learning, best practices, and global collaboration – and by promoting careers devoted to this crucial work.

Founded in 1984, Bentley has more than 2,800 colleagues, offices in more than 50 countries, annual revenues surpassing \$500 million, and since 1993, has invested more than \$1 billion in research, development, and acquisitions. Nearly 90 percent of the Engineering News-Record Top Design Firms are Bentley subscribers, and a 2008 Daratech study ranked Bentley as the world's #2 provider of geospatial software solutions.



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## AECO Interoperability

Architects...Engineers...Contractors...Owners... working as one.

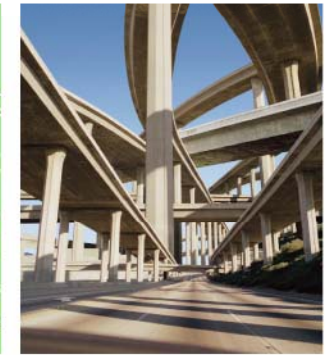
Passionate about identifying and defining requirements for business interoperability and the resultant benefits...

data requirements, workflows, liability, accelerating understanding...

fact or fiction, key concepts, real-world examples...

join the debate!





# Thank you!

Andy Smith, AIA  
[andy.smith@bentley.com](mailto:andy.smith@bentley.com)

