

Giving Owners What They Want: Facility Information from Building Information Models



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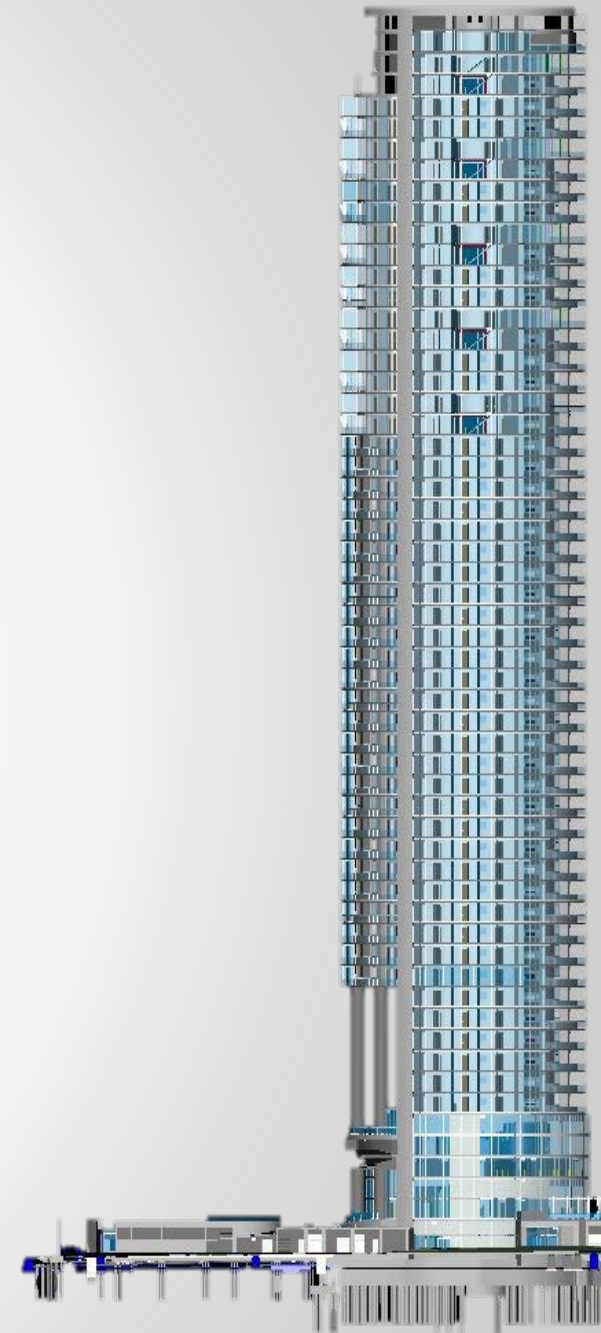
Program Outline, Learning Objectives, Speaker Profiles



Learning Objectives:

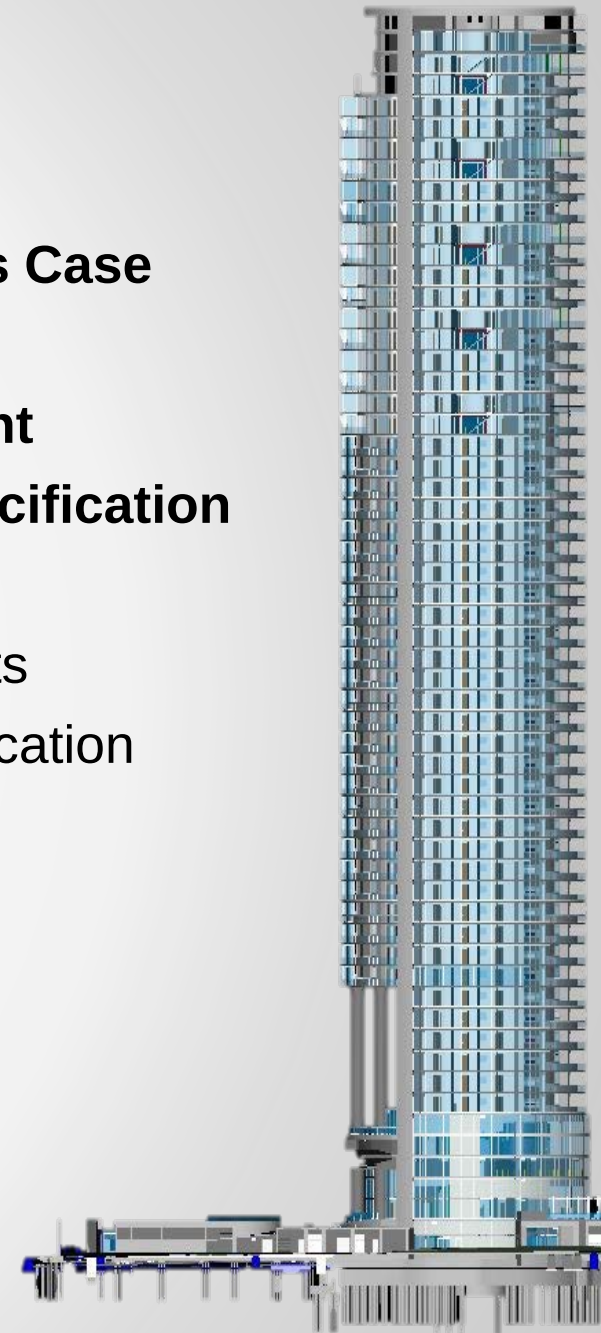
At the end of this session, participants will be able to:

- define the contents of a Facility Information Specification;
- analyze the building information needs of building owners and organize them into a structured format;
- prepare a detailed Facility Information Specification using the Construction Operations Building Information Exchange;
- compile structured building information in Revit using the Revit COBie extension, the Space Naming Utility, and the Room Calculation Point.



Program Outline:

- BIM2FM Information Delivery: **Business Culture and Business Case**
- BIM2FM Implementation Strategy: **What We Can Do Now**
- Overcoming Challenges: **International Standards Development**
- BIM2FM Information Deliverable: **The Facility Information Specification**
- The Role of **COBie** in the **BIM2FM Process**
- **The Owner's Role:** Specifying Facility Information Requirements
- **The Designer's Role:** Preparing the Facility Information Specification
- **COBie in Revit 2014:** Tips and Tricks
- **Insights from Real-world BIM2FM Implementations**



Building Life Cycle Information Group

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The Business Case

Buildings cost far more to operate than to design and build.

The Challenge

Most of the building information delivered to owners is never used.

The Opportunity

Building owners can unlock the value in their building information models.

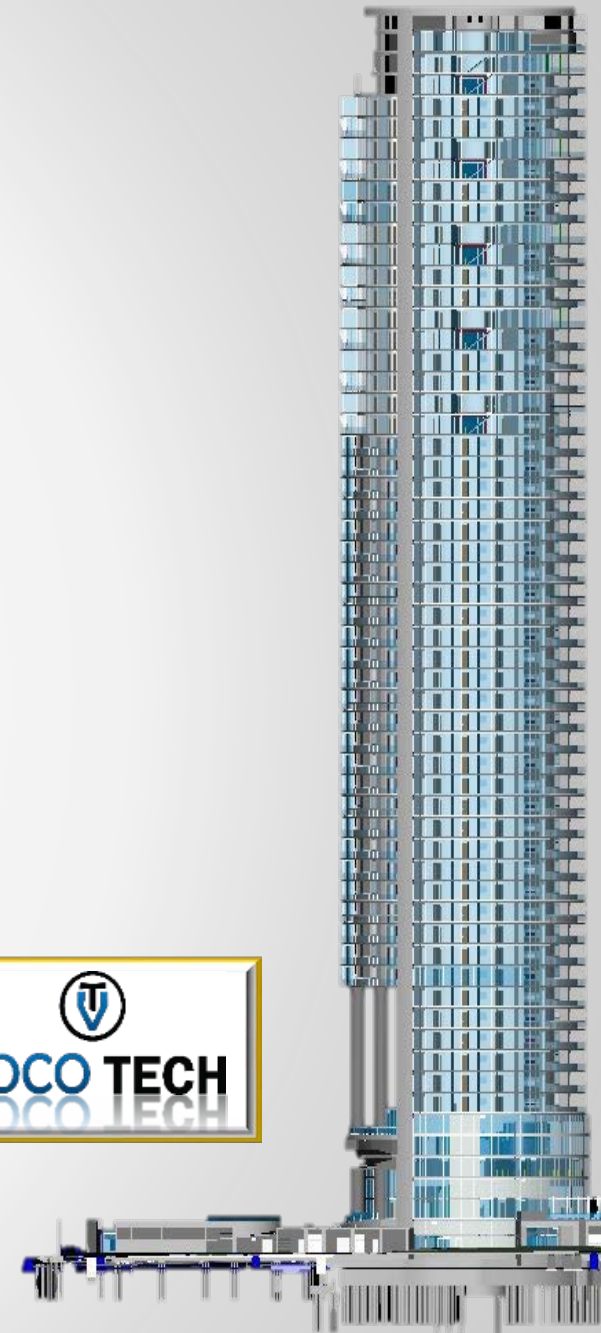


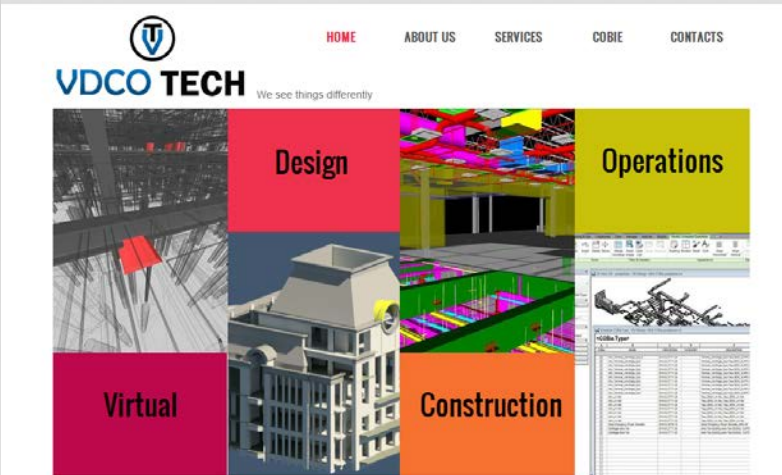
Birgitta Foster

VP Operations & Facility Integration at VDCO Tech

Albuquerque, New Mexico (Albuquerque, New Mexico Area)
Information Technology and Services

- Current **VP Operations & Facility Integration at VDCO Tech**
- Past Director of Facilities Integration at ACAI Technologies
Assisting Director at buildingSMARTalliance
A/E Partnership Lead/ Facilities BIM Champion at Sandia National Laboratories
Partnership Development Lead at Sandia National Laboratories
Project Manager at Klinger Constructors
Engineering Manager at Rust Enerpac/Power Systems
Mechanical Engineer at John Brown Engr & Construction
Application Engineer at Ingersoll Rand
[see less](#) ^
- Education The University of New Mexico - Robert O. Anderson School of Management
The University of Texas at Austin
- Connections 500+ connections





We see things differently

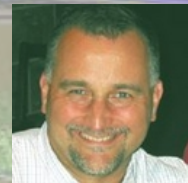


VDCO Tech views projects utilizing **BIM2FM** not ending with the owner, but **starting with the owner**. Who else knows best **what information** is important to their business processes.

VDCO Tech does not consider a **BIM** just a **final deliverable** but as **virtual digital asset** that should be **leveraged** as far into the **building lifecycle** as possible. As a provider of Virtual Design-Construction-Operation services, we support BIM as essential to the project process, but see the **full value** a **BIM** found during **operational life** of the building where the **majority of the life cycle costs** occur.

We look at **BIM** as not only a visual tool but as a **vehicle** for capturing and delivering valuable building information. We view BIM enabled projects not just **benefiting** the owner and their operators but also the **other business centers** who need **access** to the same building information.

BIM2FM Information Delivery: Business Culture & Business Case



The Business Culture:

Architects, engineers, and contractors...

- live in a **model-centric** world.

Building owners...

- live in an **information-centric** world.
- Most are ***not yet ready*** to manage “live” **building information models**;
- Many ***are ready*** to manage the **building information** that can be obtained from models.

This session...

- explains how to deliver **building information** to owners ***in a form they can actually use.***

The Business Case:

Of the total building life cycle cost:

- **10-25%** is incurred during design and construction.
- **75-90%** is incurred during occupancy.
- Building information needed for FM, O&M is created during design and construction, but is not **efficiently and reliably captured** and delivered to the owner.
- Lack of reliable, accurate building information results in significantly **higher costs** for facility management, operations and maintenance.

Owners **already** require this information as contract deliverables; now it can be delivered in a form **useful** for FM / O&M.

BIM2FM Implementation Strategy: What We Can Do Now



Building Information 2014:

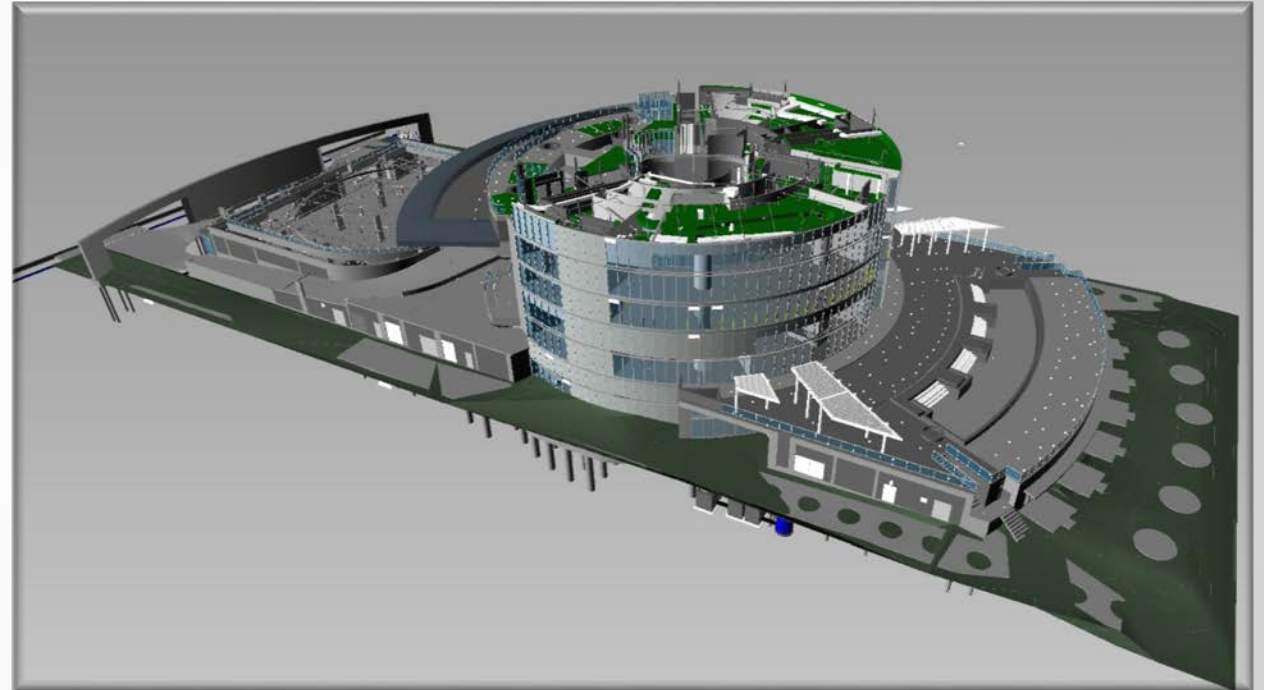
Let's look at what we can do now...

- Building information that is **readily available** today.
- How to deliver **only** the building information needed by the owner.
- How to deliver building information **in a timely manner**.

Building Information 2014:

What information is **readily** available:

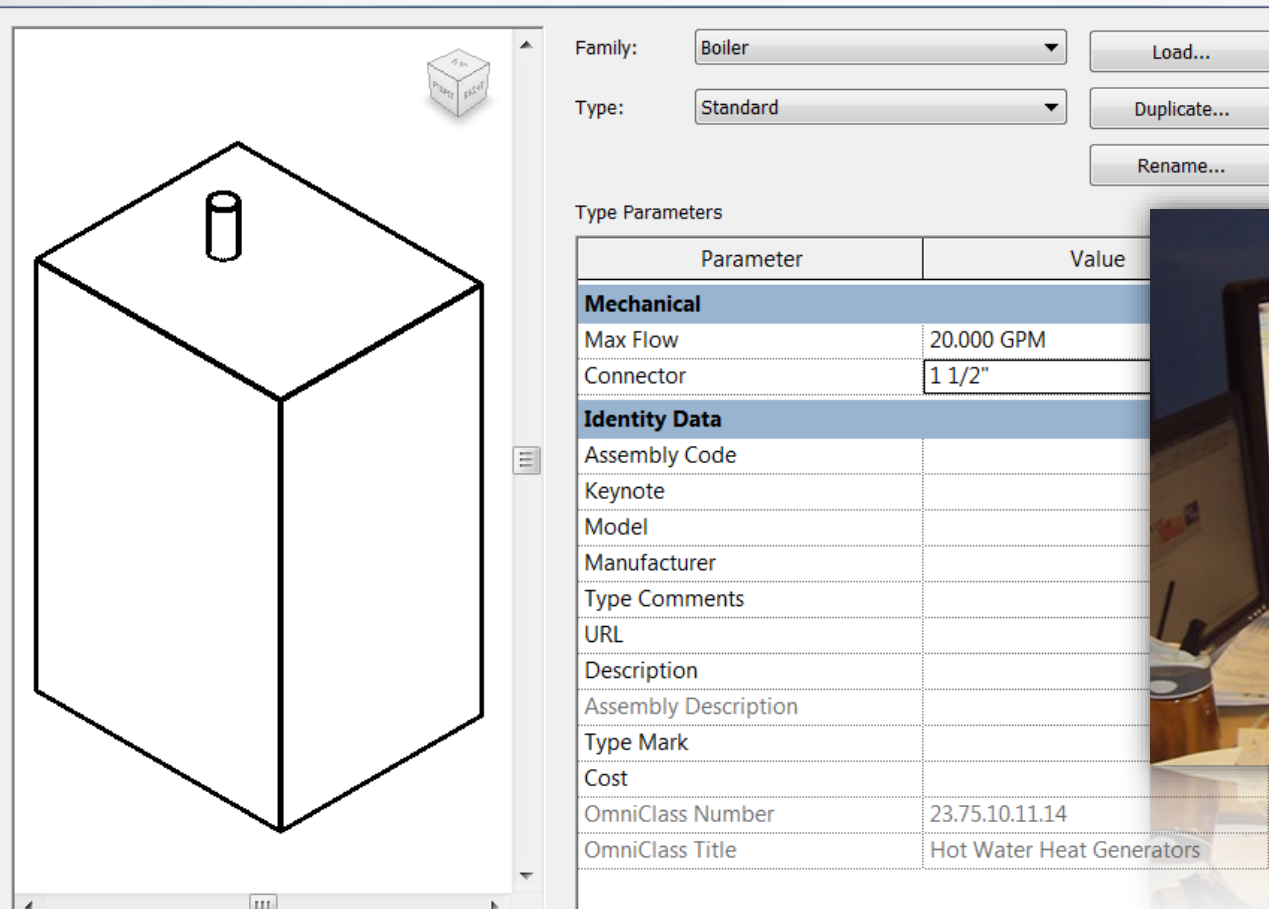
- Project Information
 - ✓ Building Name
 - ✓ Site Address
- Floor & Room Information
 - ✓ Name / Number
 - ✓ Occupancy Type
 - ✓ Area (s.f.)
 - ✓ Finishes
- Assets
 - ✓ Type
 - ✓ Location
 - ✓ Instances



Building Information 2014:

What information is **readily** available:

- **BIM Software Objects - Generic**



The screenshot displays a BIM software interface. On the left, a 3D model of a boiler is shown as a white cube with a small cylinder on top. To the right of the model, there are controls for the object's family and type, and a table of type parameters.

Family: Load...

Type: Duplicate... Rename...

Type Parameters

Parameter	Value
Mechanical	
Max Flow	20.000 GPM
Connector	1 1/2"
Identity Data	
Assembly Code	
Keynote	
Model	
Manufacturer	
Type Comments	
URL	
Description	
Assembly Description	
Type Mark	
Cost	
OmniClass Number	23.75.10.11.14
OmniClass Title	Hot Water Heat Generators



Overcoming Challenges: International Standards Development



Building Information 2014: Solution: International Data Dictionary

buildingSMART Data Dictionary

Search

Tools

Browse

About

Context filter

buildingSMART Data Dictionary

ISO 12006-3 based ontology for the building and construction industry

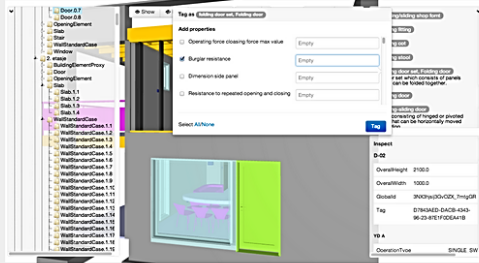


Image courtesy of bimaync.com

Welcome to the buildingSMART Data Dictionary. You may browse and search the content of the buildingSMART Data Dictionary from this web page. We highly recommend that you register as a user, but it is possible to access the Dictionary without registering. It is also possible to use the buildingSMART Data Dictionary Application Programming Interface (API) and data from the Data Dictionary in your own applications. For more information see below or contact the [buildingSMART Data Dictionary Support Team](#). More information about the Data Dictionary is available at [buildingSMART Data Dictionary's formal web site](#).

To join the [community](#), where you can report issues, discuss use cases or just help each other out, please go to our [community site](#).

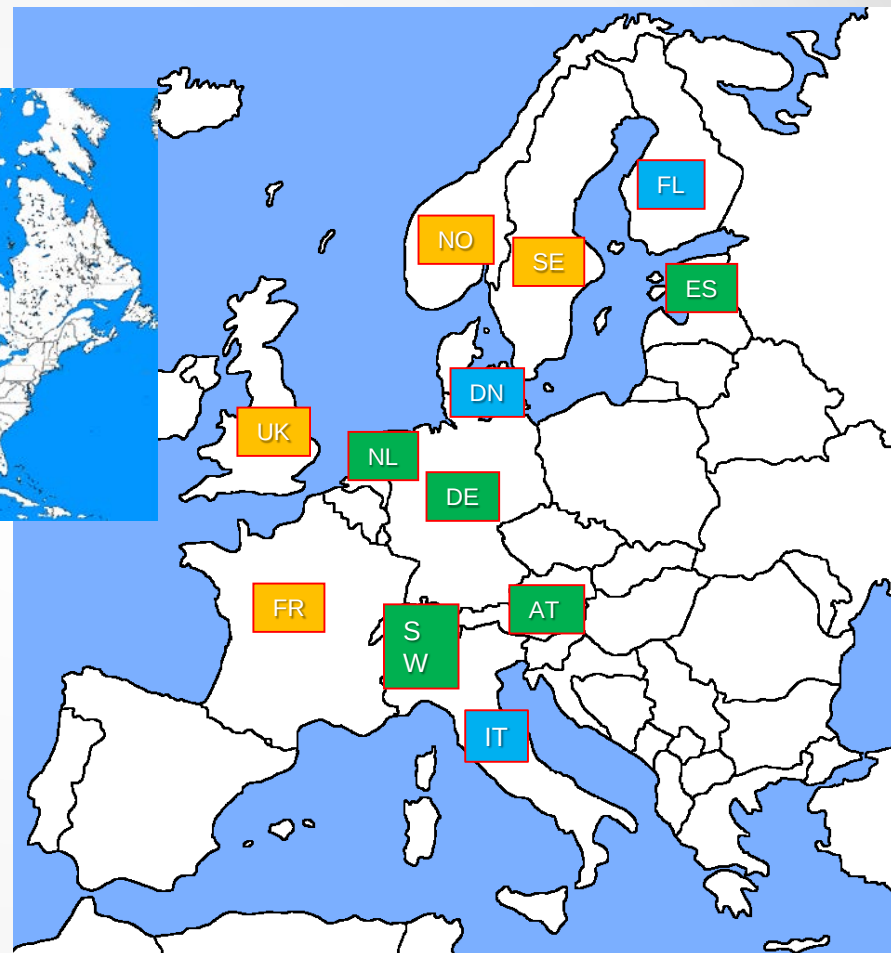
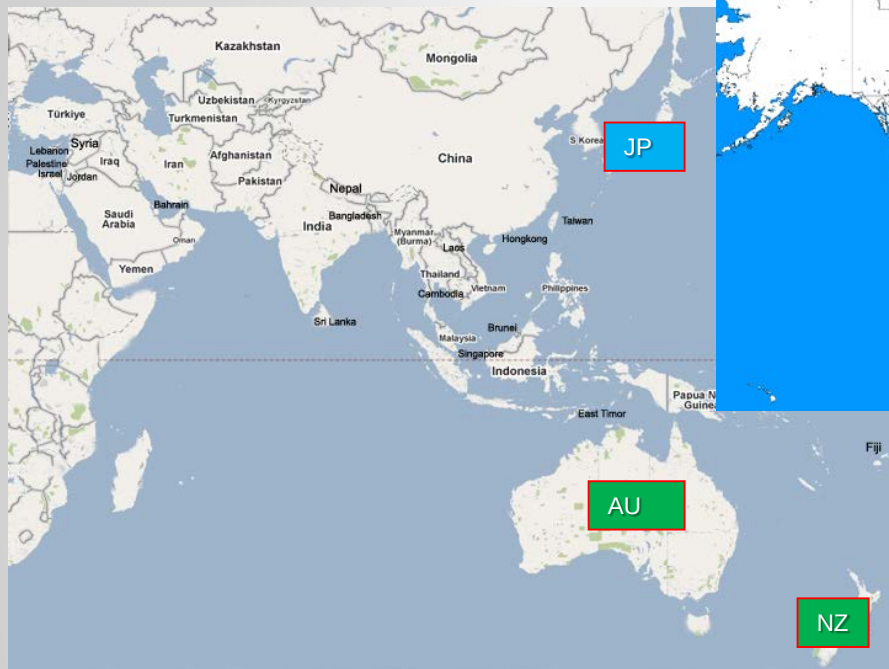
API

Legal

System Information

<http://bsdd.buildingsmart.org>

Current Pilot Participants: Seventeen (17) Countries



Building Information 2014:

Solution: International Data Dictionary

The screenshot displays the buildingSMART Data Dictionary interface. The top navigation bar includes links for Search, Tools, Browse, About, and Context filter. A search bar on the left contains the term 'door'. Below it, a list of search results shows 'DOOR' as the primary result, with sub-results for 'door set, door' and 'door panel, door leaf, door'. The main content area features a 3D model of a door and a detailed description: 'door set, door' (3vHRQ8oT0Hsm00051Mm008), dated 2012.11.05 13:57:25. It lists translations in Norwegian ('dør med karm, door set'), French ('bloc-porte'), German ('Türeinheit (von einem Anbieter)'), and Dutch ('Deur', 'IfcDoor'). A definition states: 'a complete unit consisting of a door frame and a door leaf or leaves, supplied with the essential hardware and wheatherseal, as a product from a single source, A barrier to an entry that usually swings or slides to open and close the entry.' Below this, a list of properties is shown, including accessibility performance, air permeability, burglar resistance, CE-mark, code performance, color name, and colour. On the right, a section titled 'is documented in' lists various standards and documents, such as 'Ceco document 123456', 'doors', 'ENV 1627:1999 Windows, doors, shutters - Burglar resistance - Requirements and classification', 'ENV 1628:1999 Windows, doors, shutters - Burglar resistance - Test method for the determination of resistance under static loading', 'ENV 1629:1999 Windows, doors, shutters - Burglar resistance - Test method for the determination of resistance under dynamic loading', 'ENV 1630:1999 Windows, doors, shutters - Burglar resistance - Test method for the determination of resistance to manual burglary attempts', 'hEN Standart Test Document - 02.12.2013', 'norwegian standard ns-en 1192', 'NS 3214:1985 Security glazing - Hard body impact testing', 'NS 3215:1985 Security glazing - Sharp body impact testing', 'NS 3216:1985 Security glazing - Testing of bullet resistance', and 'NS 3217:1985 Security glazing - Classification of resistance'.

<http://bsdd.buildingsmart.org>

Building Information 2014:

Solution:

Standardize

Product Templates

<http://www.wbdg.org/>

The screenshot displays the WBDG (Whole Building Design Guide) website, which is a program of the National Institute of Building Sciences. The page is titled "productguide™" and "Specifiers' Properties Templates". It features a navigation menu with categories like DESIGN GUIDANCE, PROJECT MANAGEMENT, OPERATIONS & MAINTENANCE, DOCUMENTS & REFERENCES, TOOLS, CONTINUING EDUCATION, and BIM. The main content area is titled "HVAC PRODUCTS" and lists three items: Chiller_AIRCOOLED, Fan_CENTRIFUGALAIRFOIL, and Pump_CIRCULATOR. Each item has a 3D model and a "View Template" link. The left sidebar contains links to various resources including FEDERAL HIGH PERFORMANCE AND SUSTAINABLE BUILDINGS, FEDERAL MANDATES, CONSTRUCTION CRITERIA BASE, and PRODUCTGUIDE.

Object Type	Default Geometry	Property Template
Chiller_AIRCOOLED		View Template
Fan_CENTRIFUGALAIRFOIL		View Template
Pump_CIRCULATOR		View Template

Building Information 2014:

Solution:

Standardize

Product Templates

<http://www.wbdg.org/>

The screenshot shows the WBDG (Whole Building Design Guide) website. The header includes navigation links: HOME, ABOUT, CONTACT, SITE MAP, LOG IN, and social media icons. A secondary navigation bar lists categories: DESIGN GUIDANCE, PROJECT MANAGEMENT, OPERATIONS & MAINTENANCE, DOCUMENTS & REFERENCES, TOOLS, CONTINUING EDUCATION, and BIM. The main content area is titled 'productguide™' and 'Specifiers' Properties Templates'. It features a sidebar with links to 'FEDERAL HIGH PERFORMANCE AND SUSTAINABLE BUILDINGS', 'FEDERAL MANDATES', 'CONSTRUCTION CRITERIA BASE', and 'PRODUCTGUIDE'. The 'PRODUCTGUIDE' section includes 'Specifiers' Properties Templates' with 'Search' and 'Feedback' options. The main content area shows 'HVAC PRODUCTS' with a table listing 'Object Type' (Chiller_AIRCOOLED), 'Default Geometry' (a 3D model of a chiller), and 'Property Template' (a link to 'View Template').

The screenshot shows the 'productguide' website for 'Boiler WATER'. It includes a breadcrumb trail: Home > Documents & References > ProductGuide > Specifiers' Properties Templates > Search > Template. The page title is 'Boiler WATER' with the subtitle 'WATER: Water boiler.' Below this is a 'Classifications' section with a table listing various boiler types and their codes. The 'Downloads' section lists various file formats (HTML, XHTML, COBIE, IFCXML, IFC) and their corresponding download links.

Type	Code	Title
MasterFormat™ 2004	23 52 00	Heating Boilers
UniFormat™ 1999	D3020	Heat Generating Systems
OmniClass™ Table 21 - 2011	21-04 30 20	Heating Systems
OmniClass™ Table 22 - 2006	22-23 52 00	Heating Boilers
OmniClass™ Table 23 - 2010	23-33 11 00	Commercial Boilers

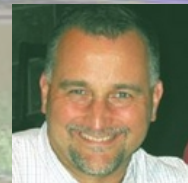
Downloads
Sep 01, 2011

Type	Title
HTML	Boiler_WATER_USTypeProduct.html
XHTML	Boiler_WATER_US.xhtml
COBIE	Boiler_WATER_US.SPie2.xls
IFCXML	Boiler_WATER_US.ifcxml
IFC	Boiler_WATER_US.ifc

The screenshot shows the 'productguide' website for 'Boiler WATER' with a detailed table of attributes and values. The table lists various attributes such as 'UFGS Section and Date', 'Name', 'Type', 'Location', 'Placement', 'Basis-of-Design Manufacturer', 'Basis-of-Design Model', 'Basis-of-Design Notes', 'Current', 'Voltage', 'Frequency', 'Input Power', 'Output Power', 'Water Flow', 'Entering Water Temp', 'Leaving Water Temp', 'Vent Diameter', 'Paces', 'Pressure Drop', 'Energy Source', 'Fuel Type', 'Output Media', 'Sustainability', 'System Description', 'Boiler Type', 'Fuel Burning Equipment', 'Components', and 'Fittings and Accessories'. Each attribute is associated with a source (e.g., UFGS, COBIE), a unit, and a value.

Attribute	Source	Unit	Value
UFGS Section and Date	UFGS MAY 2012	23 52 00	HEATING BOILERS 04/08
OCCS Table 23 Properties	OCCS MAY 2012	23-33 11 00	Commercial Boilers
Name	COBIE Guide	n/a	Type XX Space-01
Type	COBIE Guide	n/a	Type XX
Location	COBIE Guide	n/a	space name
Placement	COBIE Guide	n/a	space - ceiling - wall - chase - site - roof
Basis-of-Design Manufacturer	COBIE Guide	n/a	non-proprietary - proprietary
Basis-of-Design Model	COBIE Guide	n/a	manufacturer's model number
Basis-of-Design Notes	COBIE Guide	n/a	insert notes
Current	COBIE Guide	Amps	insert value
Voltage	COBIE Guide	Volts	insert value
Frequency	COBIE Guide	Hz	insert value
Input Power	COBIE Guide	kW	insert value
Output Power	COBIE Guide	kW	insert value
Water Flow	COBIE Guide	cu.m/hr	insert value
Entering Water Temp	COBIE Guide	C	insert value
Leaving Water Temp	COBIE Guide	C	insert value
Vent Diameter	COBIE Guide	mm	insert value
Paces	COBIE Guide	n/a	insert value
Pressure Drop	COBIE Guide	kPa	insert value
Energy Source	COBIE Guide	n/a	insert value
Fuel Type	COBIE Guide	n/a	insert value
Output Media	COBIE Guide	n/a	insert value
Sustainability	COBIE Guide	n/a	energy saving - regional sourcing - local supply - scheduled maintenance
System Description	UFGS 1.2	n/a	packaged hot water and steam boiler systems
Boiler Type	UFGS 2.2	n/a	firetube - watertube - cast iron - condensing - hot water heating - steam heating
Fuel Burning Equipment	UFGS 2.3	n/a	gas burner - oil burner - combination gas-oil burner - steam atomizer - mechanical pressure atomizer
Components	UFGS 2.4/2.5/2.6	n/a	combustion control - pumps - radiators - convectors - unit heaters - heating and ventilating units - air handling units
Fittings and Accessories	UFGS 2.12	n/a	blowers - headers - vents - gaskets - pipes - pipe connectors - valves - air vents - insulation - storage system - water treatment

BIM2FM Deliverable: The Facility Information Specification



What we can do now:

Create a **Facility Information Specification** that can be added to the General Conditions of A/E and GC/CM contracts that defines:

- **Who** will deliver the information.
- **What** information will be delivered.
- **When** the information will be delivered.
- **Why** the information is needed.
- **How** the information will be delivered.

What is included in a typical Facility Information Specification?

Spatial data – the area and configuration of building spaces.

Equipment lists and **building component schedules**.

Building equipment and component **spec information**.

Building equipment and component **warranty information**.

Spare and replacement **parts lists**.

Owners' manuals and **user guides**.

Preventative maintenance schedules and instructions.

None of these information deliverables are new; they are already required and delivered as:

Construction Documents:

- **Spatial data.**
- **Equipment lists and schedules.**
- **Building equipment / building component specifications.**
- **Building equipment / building component warranty information.**

GC / CM Submittals:

- **Spare and replacement parts lists.**
- **Owners' manuals and user guides.**
- **Preventative maintenance schedules and instructions.**

Facility Information Specification Components:

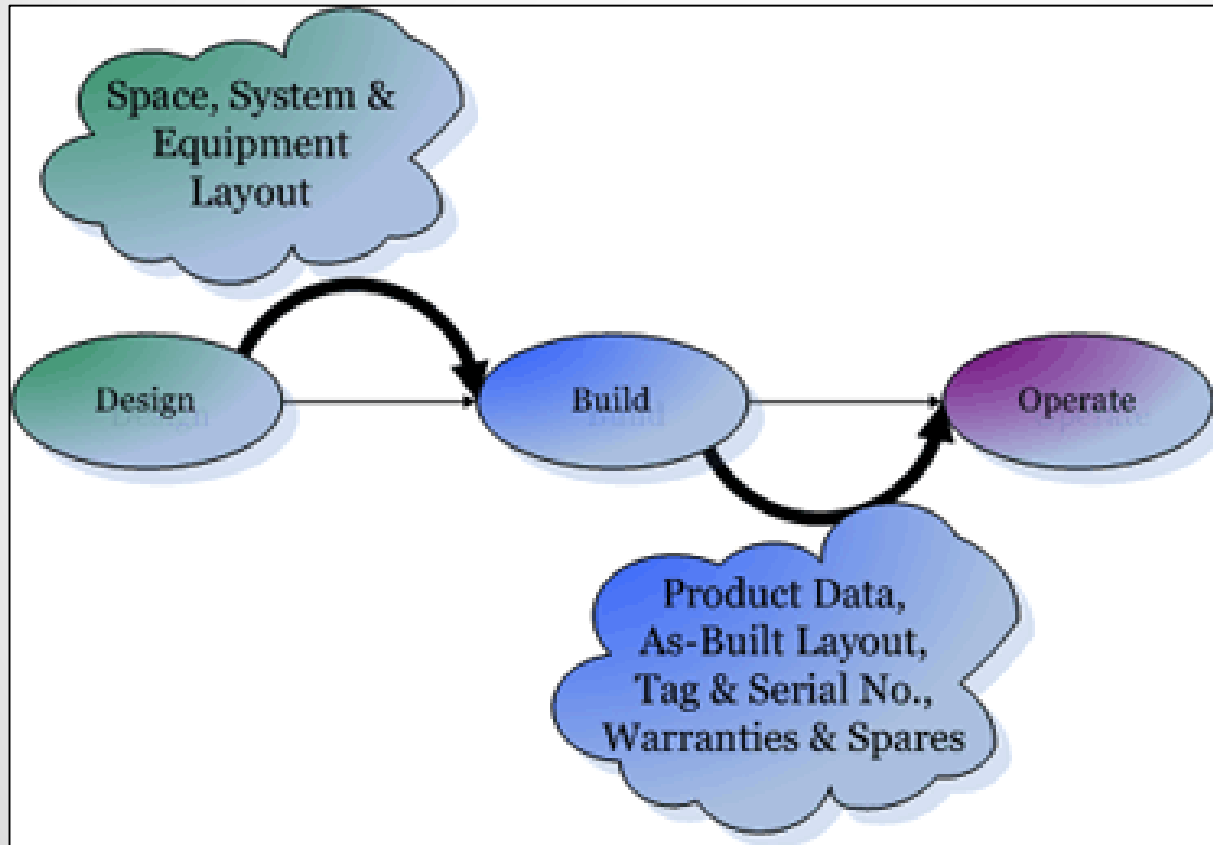
- Facility Information **Scope**
- Owner's Proprietary **Naming Conventions**
- Progressive Data Delivery **Schedule**
that aligns with the design/construction deliverable/submittal schedule.
- Required data exchange **format(s)**
compatible with the owner's CAFM, CMMS, or IWMS system.

The role of COBie in the BIM2FM Process



How does the BIM2FM process work?

Building information already flows with the design and construction process - *manually*.



✓ **COBie**, the **Construction-to-Operations Building Information Exchange**, provides a framework for organizing that building information - *electronically*.

What is COBie?

COBie is a **data schema** – an organizational framework that allows building information created in **design and construction software** to be exported directly to an owner's **facility management software**.

COBie is a free, publicly-available **information exchange standard** promulgated by the buildingSMART alliance of the National Institute of Building Sciences.

COBie **is not** a software application; **is not** a data file format; **does not** require licensing; and **does not** require owners to change software or disrupt business processes.

COBie facilitates **information exchange**; nothing more.

How is COBie used?

Software companies **integrate support** in software for creating and importing / exporting COBie data sets.

Building owners define their own **Facility Information Specification** – the specific data they actually need and want.

AEs and GC/CMs **compile** the owner's specified data in their own design and construction software, then **export** the data.

Building owners **import** the data into their own CAFM, CMMS, or IWMS software systems.

How is the information imported / exported?

COBie supports three data formats:

- ✓ MS-Excel
- ✓ IFC (buildingSMART Industry Foundation Classes)
- ✓ XML

MS-Excel

- Supports exchange of **alphanumeric data** (words and numbers) only.
- Most common “human readable” data format – **no special software needed** to receive, review, and validate AEC information deliverables.
- Allows information exchange (import /export) **with hundreds of other applications** that support *.xls or *.csv file formats.

Name	TypeName	Space	Description	tSystem	SerialNumber	InstallationDate	WarrantyStartDate
AC Unit Type 1 AC-1	AC Unit Type 1	1B21	AC Unit	n/a	YNC54980	2011-04-22T10:30:25	2011-04-22T10:30:25
AC Unit Type 1 AC-2	AC Unit Type 1	1C13	AC Unit	n/a	YNC54981	2011-04-22T10:30:25	2011-04-22T10:30:25
AC Unit Type 1 AC-3	AC Unit Type 1	2B12	AC Unit	n/a	YNC54982	2011-04-22T10:30:25	2011-04-22T10:30:25
AC Unit Type 1 AC-4	AC Unit Type 1	2C15	AC Unit	n/a	YNC54983	2011-04-22T10:30:25	2011-04-22T10:30:25
AC Unit Type 2 AC-5	AC Unit Type 2	2D04	AC Unit	n/a	YNC54984	2011-04-22T10:30:25	2011-04-22T10:30:25
ACC-1	Air Cooled Chiller	1F01	M_Screw Chiller - Air Cooled - 281-1231 kW:633-703 kW:633-703 kW:1	Aut	SALM 642680	2011-01-14T17:02:59	2011-01-14T17:02:59
ACCU-1	Air Cooled Condensing Unit- Small	Site	Air Cooled Condensing Unit	n/a	QPM890	2011-02-20T10:30:25	2011-02-20T10:30:25

IFC (buildingSMART Industry Foundation Classes)

- Supports exchange of both **alphanumeric and spatial data** (geometry).
- Allows full data exchange between IFC-compliant software applications, including **CAFM, CMMS, and IWMS systems**.



XML (eXtensible Markup Language)

- Supports exchange of both **alphanumeric** and **spatial data** (geometry).
- Allows **full data exchange and synchronization** with non-IFC-compliant software applications, including **mobile apps**.
- Especially important for organizations with **mobile-enabled personnel and workflow**.



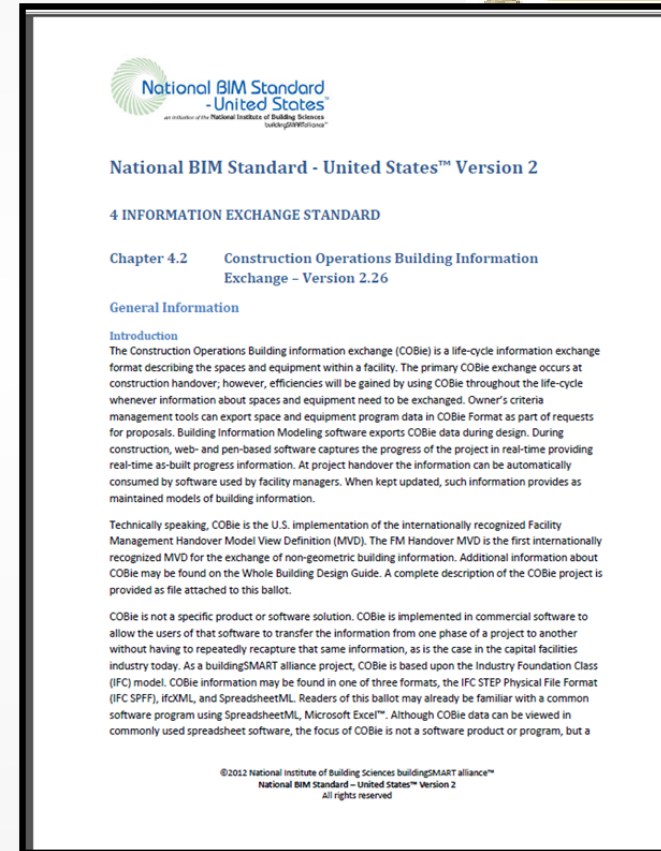
The Owner's Role: Specifying Facility Information Requirements



Building Information 2014:

How to receive only the information needed:

- **Contract: Specify Required information**
- **Method: Use Open Information Exchange Standards**

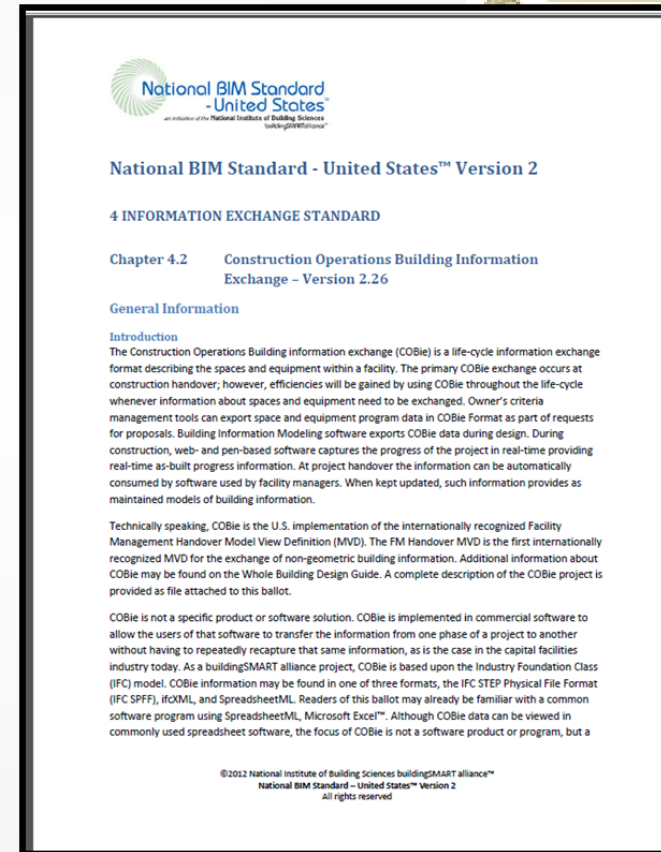


<http://www.nationalbimstandard.org/>

Building Information 2014:

How to receive only the information needed:

- **Contract: Specify Required information**
 - ✓ Asset Types
 - ✓ Data Set
 - ✓ Format
 - ✓ Naming Conventions
- **Method: Use Open Information Exchange Standards**

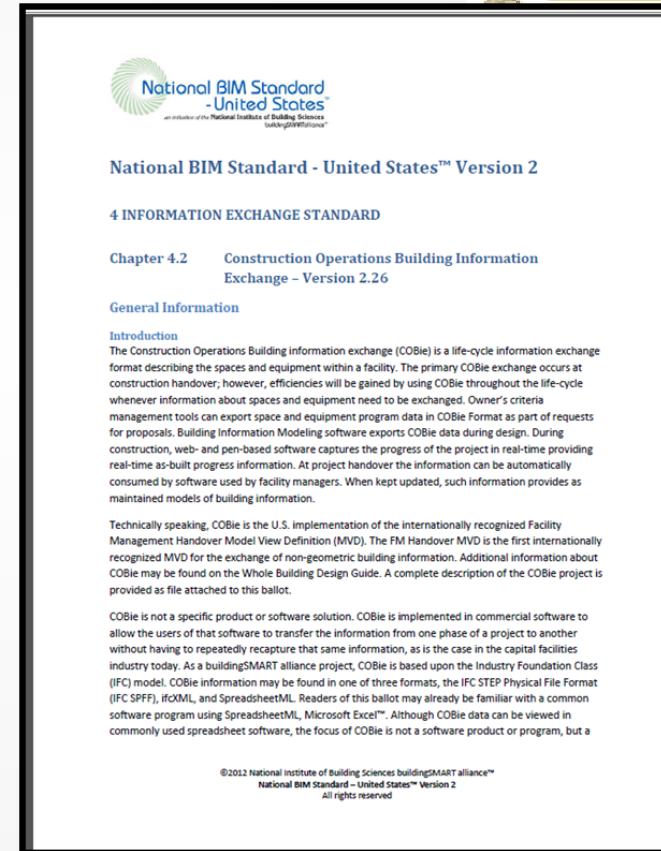


<http://www.nationalbimstandard.org/>

Building Information 2014:

How to receive only the information needed

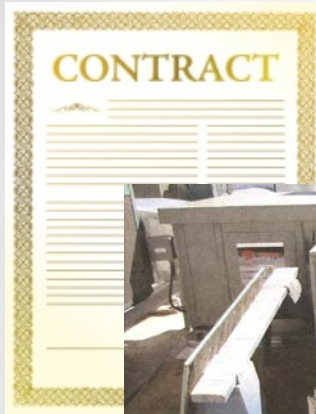
- **Contract: Specify Required information**
 - ✓ Asset Types
 - ✓ Data Set
 - ✓ Format
 - ✓ Naming Conventions
- **Method: Use Open Information Exchange Standards**
 - ✓ Construction Operations Building Information Exchange (COBie)



<http://www.nationalbimstandard.org/>

Building Information 2014:

Contract: Specify Asset List



- *Air Compressor- Air-Cooled, Screw compressor (No oil)
 - *Air Compressor- Air-Cooled, Screw compressor, belt-driven
 - *Air Compressor- Air-Cooled, two-stage tooth compressors
 - *Air Compressor- Air-Cooled, Reciprocating
 - *Air Compressor- Screw compressor, direct-driven
 - *Air Compressor- Water-Cooled, two-stage screw compressors
 - Air Dryer- Air Dryer
 - *Boiler- Boiler - OTHERS
 - *Boiler- Hot Water Heating - Fire Tube
 - *Boiler- Hot Water Heating - Cast Iron
 - *Boiler- Hot Water Heating - Electric
 - *Boiler- Hot Water Heating - HP Steam
 - *Boiler- Hot Water Heating - Water Tube
 - *Chiller- Air Cooled - Centrifugal
 - *Chiller- Air Cooled - Reciprocating
 - *Chiller- Air Cooled - Screw
 - *Chiller- Air Cooled - Scroll
 - *Chiller- Water Cooled - Magnetic
 - *Chiller- Water Cooled - Centrifugal
 - *Chiller- Water Cooled - Reciprocating
 - *Chiller- Water Cooled - Screw
 - *Chiller- Water Cooled - Scroll
 - Compressor- Compressor
 - CRAC Unit- Computer Room Air Conditioner
 - Evaporative Cooler- Evaporative Cooler
 - Fan Coil- Fan Coil
 - Fire Extinguishers- Fire Extinguishers
 - Furnace- Forced Air Furnace
 - Furnace- Furnace
 - Generator Diesel - Diesel system
 - Heat Exchanger- Chilled Water - Heat Exchanger
 - Heat Exchanger- Process Chilled Water - Heat Exchanger
 - Heat Exchanger- Process DI Water - Heat Exchanger
 - Package Unit- Package Unit
 - Tank Buffer - Buffer Tank
 - Tank Condensate- Condensate Tank
 - Tank Cryogenic- Cryogenic Tank
 - Unit Heater- Unit Heater
 - Window Unit- Window AC Unit
- (* indicates asset types requiring serial numbers)

Building Information 2014:

Contract: Specify Owner (COBie) Data Set



T-Series Climate Changer™ Air Handler

ORDER NO. V1K131B B/M A
 UNIT SERIAL NO. K09C64038A
 UNIT MODEL NO. TSCB040U0F000000000AS0AA412.5
 CONTROLS SERIAL NO. K09C64039A
 CONTROLS MODEL NO. TSCB040N0F00000000000000000000300A000000000000

SUPPLY FAN MODULE

MODULE NO. 09 OF 10
 MODULE SERIAL NO. K09C64040A

FAN MODULE SERVICE MODEL NO. TSCB040GBP0AABEAL0EABECABAB0A0000A00FB00A

MOTOR VOLTAGE 460-503 MOTOR HORSEPOWER (HP) 30
 MOTOR FLA (PER NEC) 40.0
 MINIMUM CIRCUIT AMPACITY 50.0
 MAXIMUM OVERCURRENT PROTECTION 80.0

LIGHTS/OUTLET CIRCUIT 115 VOLTS 60HZ 1PH 15 AMPS 41A/LIGHT
 EXTERNAL MOTOR OVERLOAD DEVICE IN ACCORDANCE WITH THE NATIONAL
 ELECTRICAL CODE (OR CEC) IS REQUIRED WHEN NOT PROVIDED BY TRANE
 FOR OUTDOOR USE
 SUPPLY AIR TEMPERATURE LIMITATIONS:
 104 F. MAX. DRAW-THRU, 180 F. MAX. BLOW-THRU

Manufactured under one or more of the following patent numbers: 4900106, 5396782, 5096594, 5674125, 6973795, 7017356, 6237354

Trane www.trane.com Made in USA

Required Data set	Required by COBie	Required by Client
For each Facility		
Facility Type	COBie- Std	
Project Name	COBie- Std	
Site Name	COBie- Std	
Linear Units	COBie- Std	
Area Units	COBie- Std	
Volume Units	COBie- Std	
Currency Unit	COBie- Std	
Area Measurement	COBie- Std	
Project number		Client specified
Project design team		Client specified
Project Construction GC		Client specified
For each Floor		
Floor Name	COBie- Std	
Floor Classification	COBie- Std	
Description	COBie- Std	
For each Room		
Room Name	COBie- Std	
Space Classification	COBie- Std	
Floor Name	COBie- Std	
Space Description	COBie- Std	
Height		Client specified
Area		Client specified
For each Asset Type		
Asset Type Name	COBie- Std	
Asset Type Classification	COBie- Std	
Asset Type Description	COBie- Std	
Asset Type	COBie- Std	
Manufacturer	COBie- Std	
Model Number	COBie- Std	
Warranty Guarantor- Parts	COBie- Std	
Warranty Duration- Parts	COBie- Std	
Warranty Guarantor- Labor	COBie- Std	
Warranty Duration- Labor	COBie- Std	
Warranty Duration- Units	COBie- Std	
Replacement Costs		Client specified
Purchase Price		Client specified
For each Asset		
Asset Name	COBie- Std	
Asset Type Name	COBie- Std	
Asset Room Location	COBie- Std	
Asset Description	COBie- Std	
Asset #		Client specified
Serial #		Client specified
Installation Date		Client specified
For each Contact		
Email	COBie- Std	
Classification	COBie- Std	
Company	COBie- Std	
Phone	COBie- Std	

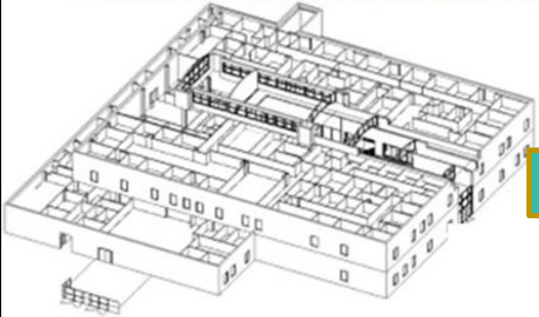
Building Information 2014:

Contract: Specify Required COBie Data Formats



Name	Category	SheetName	RowName	Value	Unit	ExtSystem	Description
Phase	Requirement	Facility	n/a	Project Status	n/a	Autodesk Revit Archi	Phase
Reflatitude	Requirement	Facility	n/a	42 12 46 8000nn	n/a	Autodesk Revit Archi	Reflatitude
Reflongitude	Requirement	Facility	n/a	-71 -1 -58 -80	n/a	Autodesk Revit Archi	Reflongitude
Project Issue Date	Requirement	Facility	n/a	Issue Date	n/a	Autodesk Revit Archi	Project Issue Date
Project Status	Requirement	Facility	n/a	Project Status	n/a	Autodesk Revit Archi	Project Status
Client Name	Requirement	Facility	n/a	Owner	n/a	Autodesk Revit Archi	Client Name
Project Address	Requirement	Facility	n/a	Enter address	n/a	Autodesk Revit Archi	Project Address
Project Name	Requirement	Facility	n/a	Project Name	n/a	Autodesk Revit Archi	Project Name

Instruction Contact Facility Floor Space Zone Type Type (2) Component Attribute



 .IFC

 .XML

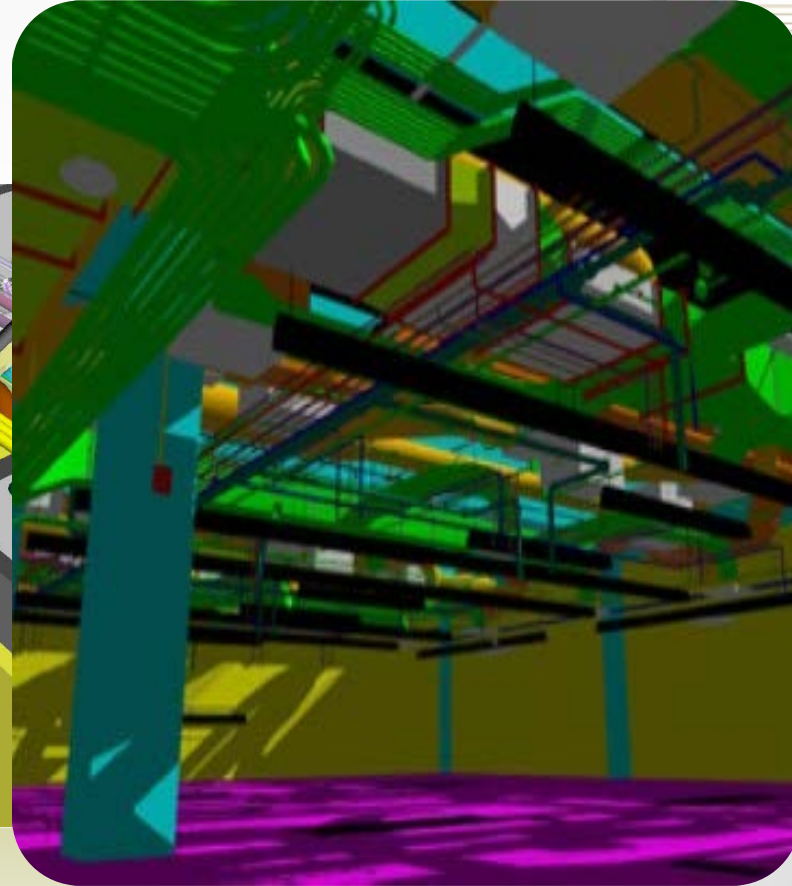
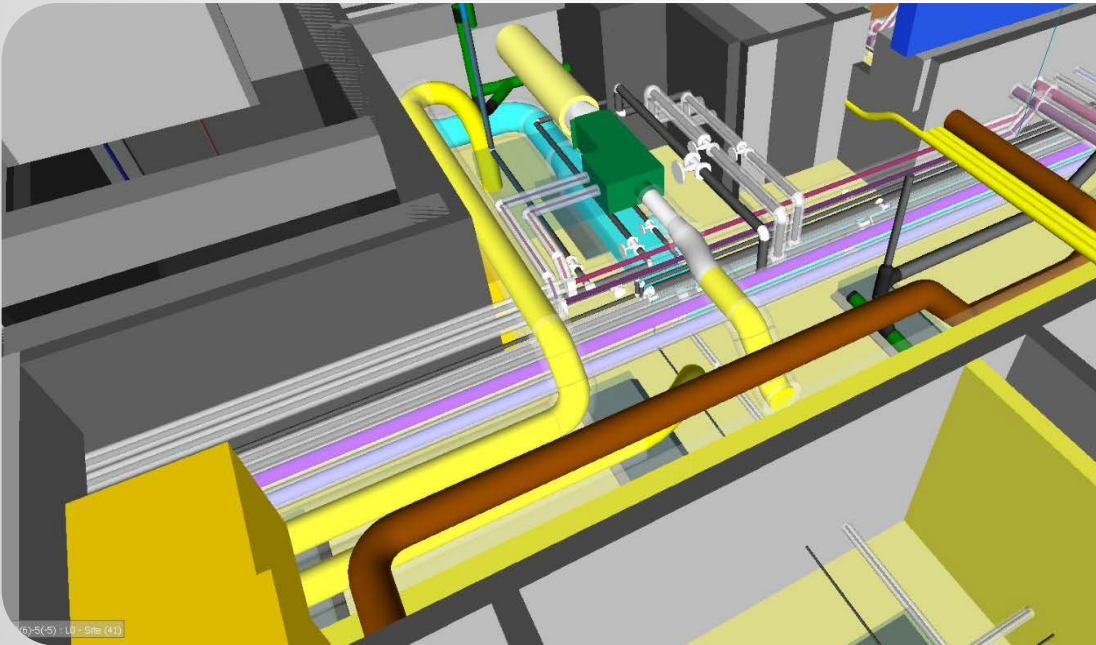
 .XLSX

```
<?xml version="1.0" encoding="UTF-8"?>
<Building>
  <Name>Project Name</Name>
  <ClientName>Client Name</ClientName>
  <ProjectStatus>Project Status</ProjectStatus>
  <ProjectIssueDate>Project Issue Date</ProjectIssueDate>
  <Reflatitude>42 12 46 8000nn</Reflatitude>
  <Reflongitude>-71 -1 -58 -80</Reflongitude>
  <Phase>Phase</Phase>
  <ProjectAddress>Enter address</ProjectAddress>
  <Owner>Owner</Owner>
  <ProjectName>Project Name</ProjectName>
  </Building>
</?xml>
```

Building Information 2014:

Contract: Specify Unique Naming Conventions

- Space Planning (Architecture)
- Asset Management (MEP)



Building Information 2014:

Contract: Specify Unique Naming Conventions

- Space Planning (Architecture)

- ✓ **Site**

- Campus Names
 - Site Location

- ✓ **Building**

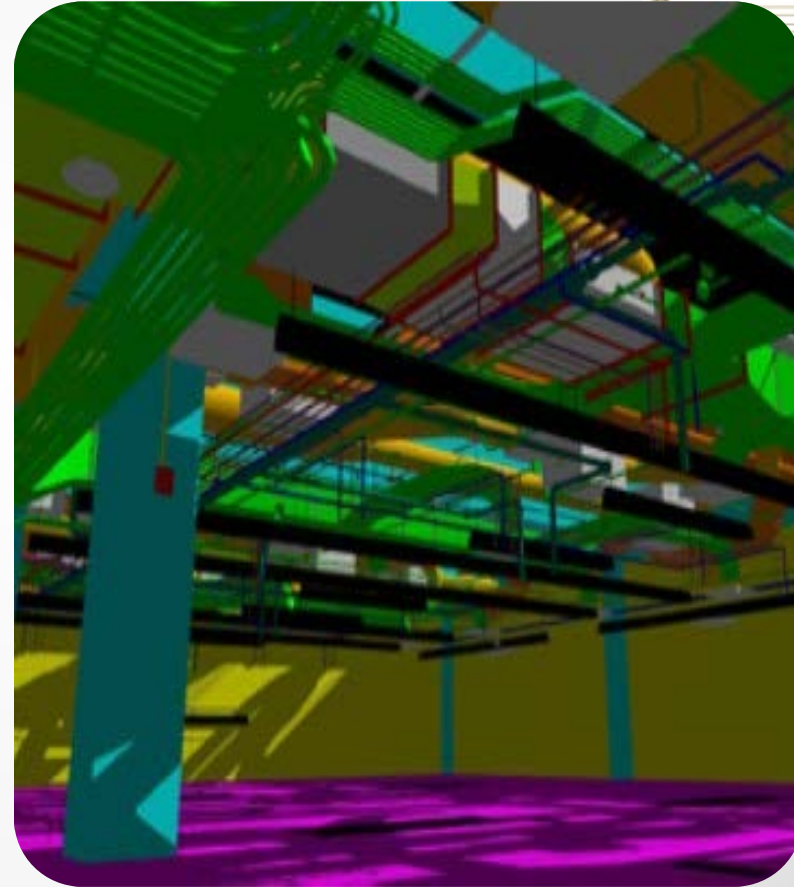
- Building Name
 - Building Number

- ✓ **Room**

- Room Names
 - Room Numbers

- ✓ **Classification Systems**

- Building Types
 - Room Types



Building Information 2014:

Contract: Specify Unique Naming Conventions

- Asset Management (MEP)

- ✓ Asset Types

- ✓ Asset Names

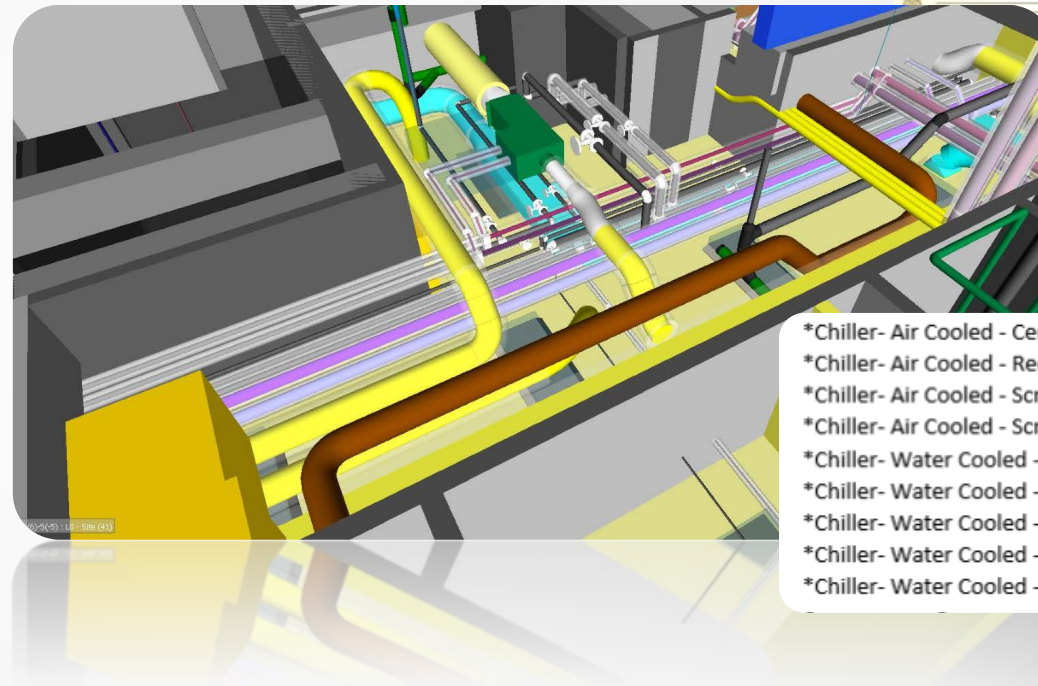
- Building Number
 - Asset Type
 - Tag Name

- ✓ Space

- Room Names (Arch)

- ✓ Classification Systems

- Asset Types



- *Chiller- Air Cooled - Centrifugal
- *Chiller- Air Cooled - Reciprocating
- *Chiller- Air Cooled - Screw
- *Chiller- Air Cooled - Scroll
- *Chiller- Water Cooled - Magnetic
- *Chiller- Water Cooled - Centrifugal
- *Chiller- Water Cooled - Reciprocating
- *Chiller- Water Cooled - Screw
- *Chiller- Water Cooled - Scroll

Building Information 2014:

How to get information in a **timely** manner:

- Contract for **Progressive Data Delivery**

Allows time for:

- ✓ Space Planning
- ✓ Training
- ✓ PM Scheduling
- ✓ Data Validation

Required Data set	Required by COBie	Available @ Design Phase
Facility Name	COBie- Std	X
Facility Type	COBie- Std	X
Project Name	COBie- Std	X
Site Name	COBie- Std	X
Linear Units	COBie- Std	X
Area Units	COBie- Std	X
Volume Units	COBie- Std	X
Currency Unit	COBie- Std	X
Area Measurement	COBie- Std	X
For each Floor		
Floor Name	COBie- Std	X
Floor Classification	COBie- Std	X
Description	COBie- Std	X
For each Room		
Room Name	COBie- Std	X
Room Classification	COBie- Std	X
Floor Name	COBie- Std	X
Room Description	COBie- Std	X
For each Asset Type		
Asset Type Name	COBie- Std	X
Asset Type Classification	COBie- Std	X
Asset Type Description	COBie- Std	X
Asset Type	COBie- Std	X
Manufacturer	COBie- Std	
Model Number	COBie- Std	
Warranty Guarantor- Parts	COBie- Std	
Warranty Duration- Parts	COBie- Std	
Warranty Guarantor- Labor	COBie- Std	
Warranty Duration- Labor	COBie- Std	
Warranty Duration- Units	COBie- Std	
For each Asset		
Asset Name	COBie- Std	X
Asset Type Name	COBie- Std	X
Asset Location	COBie- Std	X
Asset Description	COBie- Std	X
For each Contact		
Email	COBie- Std	
Classification	COBie- Std	
Company	COBie- Std	
Phone	COBie- Std	
	41	24



59%

FACILITIES INFORMATION in contract

Required Data set

Asset Name
Asset Type Name
Location
Description



FACILITIES INFORMATION in Asset Management Program

The screenshot shows the Autodesk Asset Management software interface. The main window displays a form for entering contract information. The form is divided into several sections: 'Contract Information', 'Contract Details', and 'Contract Financials'. The 'Contract Information' section includes fields for 'Contract Number', 'Contract Name', 'Contract Type', 'Contract Status', 'Contract Date', 'Contract Location', 'Contract Description', 'Contract Owner', 'Contract Manager', 'Contract Contact', and 'Contract Email'. The 'Contract Details' section includes fields for 'Contract Start Date', 'Contract End Date', 'Contract Duration', 'Contract Frequency', 'Contract Amount', 'Contract Currency', 'Contract Unit', 'Contract Rate', 'Contract Tax', 'Contract Discount', 'Contract Penalty', 'Contract Interest', 'Contract Insurance', 'Contract Warranty', 'Contract Maintenance', 'Contract Repairs', 'Contract Replacement', 'Contract Upgrade', 'Contract Downgrade', 'Contract Modification', 'Contract Termination', 'Contract Renewal', 'Contract Extension', 'Contract Cancellation', 'Contract Assignment', 'Contract Subcontract', 'Contract Sublet', 'Contract Sublease', 'Contract Sublicense', 'Contract Subtransfer', 'Contract Subconveyance', 'Contract Submortgage', 'Contract Subleasehold', 'Contract Sublicensehold', 'Contract Subtransferhold', 'Contract Subconveyancehold', 'Contract Submortgagehold', 'Contract Subleaseholdhold', 'Contract Sublicenseholdhold', 'Contract Subtransferholdhold', 'Contract Subconveyanceholdhold', 'Contract Submortgageholdhold'. The 'Contract Financials' section includes fields for 'Contract Total Cost', 'Contract Total Revenue', 'Contract Total Profit', 'Contract Total Loss', 'Contract Total Break-Even', 'Contract Total Return', 'Contract Total Risk', 'Contract Total Exposure', 'Contract Total Liability', 'Contract Total Asset', 'Contract Total Equity', 'Contract Total Debt', 'Contract Total Capital', 'Contract Total Investment', 'Contract Total Return on Investment', 'Contract Total Return on Equity', 'Contract Total Return on Debt', 'Contract Total Return on Capital', 'Contract Total Return on Investment', 'Contract Total Return on Equity', 'Contract Total Return on Debt', 'Contract Total Return on Capital'. The form is populated with data for a contract with the number '123456789', named 'CONTRACT 123456789', of type 'CONTRACT', with a status of 'OPEN', starting on '1/1/2014' and ending on '12/31/2014', with a duration of '12 months', a frequency of 'Monthly', an amount of '\$1,000,000.00', a currency of 'USD', a unit of 'Dollars', a rate of '1.00', a tax of '0.00', a discount of '0.00', a penalty of '0.00', an interest of '0.00', an insurance of '0.00', a warranty of '0.00', a maintenance of '0.00', a repairs of '0.00', a replacement of '0.00', an upgrade of '0.00', a downgrade of '0.00', a modification of '0.00', a termination of '0.00', a renewal of '0.00', an extension of '0.00', a cancellation of '0.00', an assignment of '0.00', a subcontract of '0.00', a sublet of '0.00', a sublease of '0.00', a sublicense of '0.00', a subtransfer of '0.00', a subconveyance of '0.00', a submortgage of '0.00', a subleasehold of '0.00', a sublicensehold of '0.00', a subtransferhold of '0.00', a subconveyancehold of '0.00', a submortgagehold of '0.00'. The 'Contract Financials' section shows a total cost of '\$1,000,000.00', a total revenue of '\$1,000,000.00', a total profit of '\$0.00', a total loss of '\$0.00', a total break-even of '\$0.00', a total return of '0.00%', a total risk of '0.00%', a total exposure of '0.00%', a total liability of '0.00%', a total asset of '0.00%', a total equity of '0.00%', a total debt of '0.00%', a total capital of '0.00%', a total investment of '0.00%', a total return on investment of '0.00%', a total return on equity of '0.00%', a total return on debt of '0.00%', and a total return on capital of '0.00%'. The form is titled 'CONTRACT 123456789' and is located in the 'CONTRACT' section of the software.

FACILITIES INFORMATION in contract

Required Data set
Asset Name
Asset Type Name
Location
Description



FACILITIES INFORMATION entered in Model



Asset Name	Asset Type Name
Location	Description
Asset ID	Asset Class
Asset Category	Asset Subcategory
Asset Status	Asset Condition
Asset Age	Asset Life Cycle
Asset Cost	Asset Value
Asset Depreciation	Asset Maintenance
Asset Replacement	Asset Disposal

FACILITIES INFORMATION in Asset Management Program

Asset Name	Asset Type Name
Location	Description
Asset ID	Asset Class
Asset Category	Asset Subcategory
Asset Status	Asset Condition
Asset Age	Asset Life Cycle
Asset Cost	Asset Value
Asset Depreciation	Asset Maintenance
Asset Replacement	Asset Disposal

FACILITIES INFORMATION in contract

Required Data set
Asset Name
Asset Type Name
Location
Description



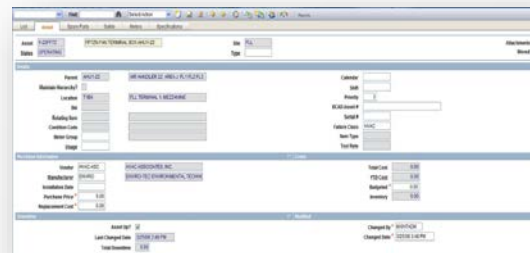
FACILITIES INFORMATION entered in Model

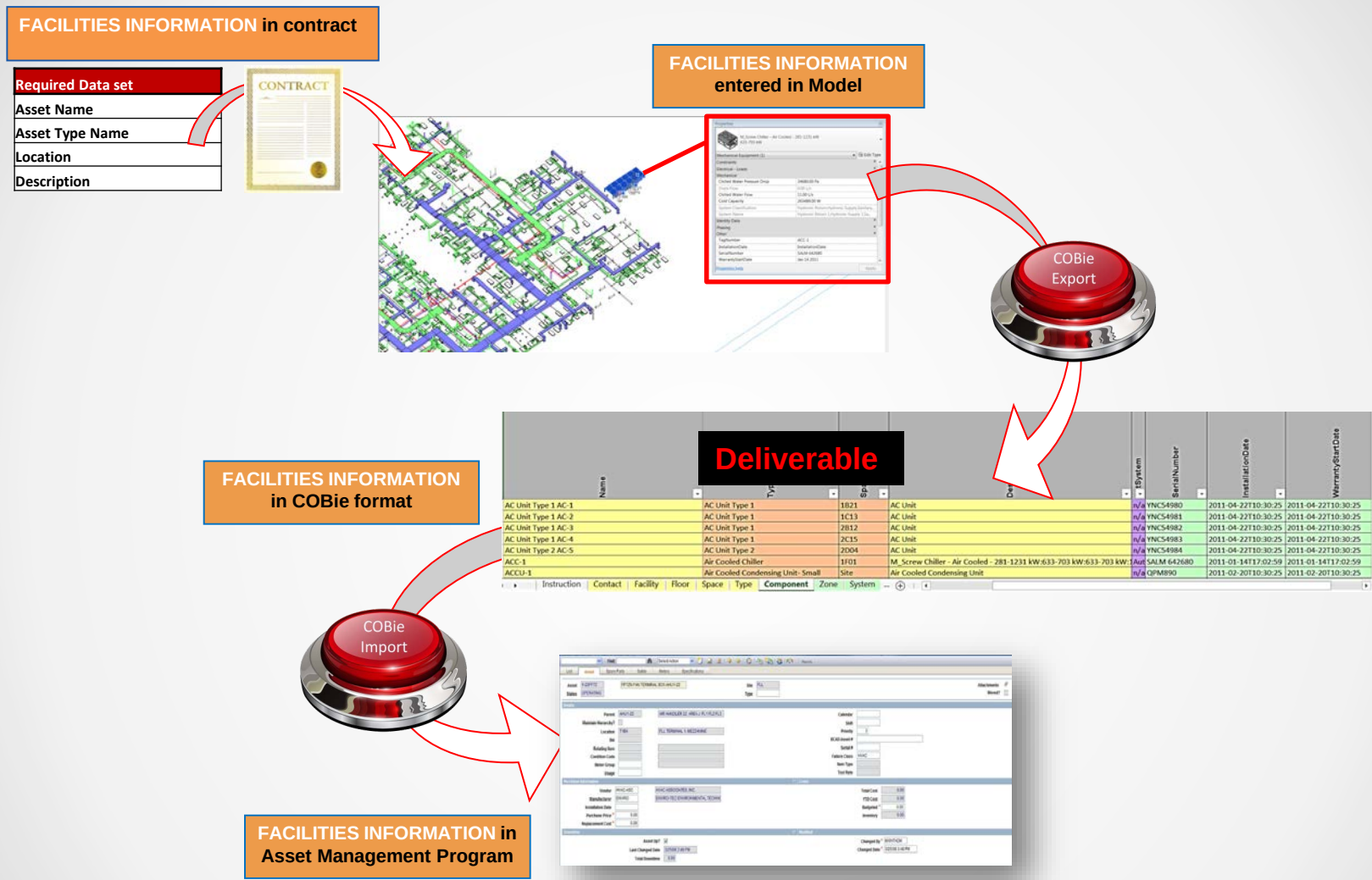


FACILITIES INFORMATION in COBie format

Deliverable									
Name	Type	Id	System	Serial Number	Installation Date	Warranty Start Date			
AC Unit Type 1 AC-1	AC Unit Type 1	1021	AC Unit	VNCS4980	2011-04-22T10:30:25	2011-04-22T10:30:25			
AC Unit Type 1 AC-2	AC Unit Type 1	1C13	AC Unit	VNCS4981	2011-04-22T10:30:25	2011-04-22T10:30:25			
AC Unit Type 1 AC-3	AC Unit Type 1	7012	AC Unit	VNCS4982	2011-04-22T10:30:25	2011-04-22T10:30:25			
AC Unit Type 1 AC-4	AC Unit Type 1	2C15	AC Unit	VNCS4983	2011-04-22T10:30:25	2011-04-22T10:30:25			
AC Unit Type 2 AC-5	AC Unit Type 2	2004	AC Unit	VNCS4984	2011-04-22T10:30:25	2011-04-22T10:30:25			
ACC-1	Air Cooled Chiller	1F01	M. Screw Chiller - Air Cooled - 281-1231 KW-633-703 KW-633-703 KW	SALM 642680	2011-01-14T17:02:59	2011-01-14T17:02:59			
ACCJ-1	Air Cooled Condensing Unit- Small	Site	Air Cooled Condensing Unit	OPM890	2011-02-20T10:30:25	2011-02-20T10:30:25			

FACILITIES INFORMATION in Asset Management Program





The Designer's Role: Preparing the Facility Information Specification



Start the conversation early

- Don't wait to be on the receiving end of an RFP.
- **Ask** your clients about their FM information needs.
- Explain that design / construction generates the information they need for FM.
- Explain that a method exists to efficiently compile that information and import it directly into their FM systems.
- Offer (as a service) to prepare a **Facility Information Specification** that the owner can incorporate into future design / construction contracts.
- Offer (as a service) to compile, validate, and deliver the data.

Facility Information Specification Components:

- Facility Information **Scope**
- Owner's Proprietary **Naming Conventions**
- Progressive Data Delivery **Schedule**
that aligns with the design/construction deliverable/submittal schedule.
- Required data exchange **format(s)**
compatible with the owner's CAFM, CMMS, or IWMS system.

Facility Information Specification Guide

Achieving effective **BIM²FM** data transfer
using the **NBIMS-USTM**

**Construction-to-Operations Building information
exchange**



BUILDING LIFE CYCLE INFORMATION GROUP

11140 ROCKVILLE PIKE, SUITE 100-151
NORTH BETHESDA, MD 20852
WWW.BLCI-GROUP.COM
240-743-9255

Develop tools to
clarify the process.

Our ***Facility
Information
Specification Guide***
is a comprehensive
workbook and
process map that
simplifies, clarifies,
and streamlines the
development of a
**Facility Information
Specification.**

Spatial Information

Facility	Project, site, and facility data. COBie data is delivered in one file per facility.
Floor	Vertical building levels, including site and roof locations for managed equipment.
Space	Spaces listed in floor plans or schedules, including roof and site locations of managed equipment.
Zone	Sets of spaces sharing a specific attribute.

Asset Information

Type	Types of equipment, building products, and building materials identified in design schedules.
Component	Individual instances of equipment, products and materials.
System	Sets of components providing a service.
Assembly	Data table in development; not required by COBie v2.4.
Connection	Data table in development; not required by COBie v2.4.

COBie data can be organized into **four (4)** logical groups of **eighteen (18)** data tables that are **meaningful to an owner.**

Operations and Maintenance Information

Spare	Onsite spare and replacement parts.
Resource	Required materials, tools, and training.
Job	PM, Safety, and other construction job plans [required submittals].
Impact	Economic, environmental, and social impacts at various stages in the life cycle.

Reference Information

Contact	People and companies referenced in the COBie data set.
Document	All applicable external document references.
Attribute	Values corresponding to design schedules for spaces, products, and equipment.
Coordinate	Data table in development; not required by COBie v2.4.
Issue	Data table in development; not required by COBie v2.4.

Facility Information Scope Definition Planning Sheet (Complete COBie Data Field List)

Spatial Information	Asset (Equipment) Information		O & M Information	Reference Information																																																																																																																																																																																	
<table><tr><th>Facility</th></tr><tr><td>[Facility] Name</td></tr><tr><td>[Facility] Category</td></tr><tr><td>ProjectName</td></tr><tr><td>SiteName</td></tr><tr><td>LinearUnit</td></tr><tr><td>AreaUnits</td></tr><tr><td>VolumeUnits</td></tr><tr><td>CurrencyUnit</td></tr><tr><td>AreaMeasurement</td></tr><tr><td>[Facility] Description</td></tr><tr><td>ProjectDescription</td></tr><tr><td>SiteDescription</td></tr><tr><td>[Facility] Phase</td></tr></table>	Facility	[Facility] Name	[Facility] Category	ProjectName	SiteName	LinearUnit	AreaUnits	VolumeUnits	CurrencyUnit	AreaMeasurement	[Facility] Description	ProjectDescription	SiteDescription	[Facility] Phase	<table><tr><th>[Asset] Type</th></tr><tr><td>[Type] Name</td></tr><tr><td>[Type] Category</td></tr><tr><td>[Type] Description</td></tr><tr><td>AssetType</td></tr><tr><td>Manufacturer</td></tr><tr><td>ModelNumber</td></tr><tr><td>WarrantyGuarantorParts</td></tr><tr><td>WarrantyDurationParts</td></tr><tr><td>WarrantyGuarantorLabor</td></tr><tr><td>WarrantyDurationLabor</td></tr><tr><td>WarrantyDurationUnit</td></tr><tr><td>ReplacementCost</td></tr><tr><td>ExpectedLife</td></tr><tr><td>DurationUnit</td></tr><tr><td>WarrantyDescription</td></tr><tr><td>NominalLength</td></tr><tr><td>NominalWidth</td></tr><tr><td>NominalHeight</td></tr><tr><td>ModelReference</td></tr><tr><td>Shape</td></tr><tr><td>Size</td></tr><tr><td>Color</td></tr><tr><td>Finish</td></tr><tr><td>Grade</td></tr><tr><td>Material</td></tr><tr><td>Constituents</td></tr><tr><td>Features</td></tr><tr><td>AccessibilityPerformance</td></tr><tr><td>CodePerformance</td></tr><tr><td>SustainabilityPerformnce</td></tr></table>	[Asset] Type	[Type] Name	[Type] Category	[Type] Description	AssetType	Manufacturer	ModelNumber	WarrantyGuarantorParts	WarrantyDurationParts	WarrantyGuarantorLabor	WarrantyDurationLabor	WarrantyDurationUnit	ReplacementCost	ExpectedLife	DurationUnit	WarrantyDescription	NominalLength	NominalWidth	NominalHeight	ModelReference	Shape	Size	Color	Finish	Grade	Material	Constituents	Features	AccessibilityPerformance	CodePerformance	SustainabilityPerformnce	<table><tr><th>Component</th></tr><tr><td>[Component] Name</td></tr><tr><td>TypeName</td></tr><tr><td>Space</td></tr><tr><td>[Component] Description</td></tr><tr><td>SerialNumber</td></tr><tr><td>InstallationDate</td></tr><tr><td>WarrantyStartDate</td></tr><tr><td>TagNumber</td></tr><tr><td>BarCode</td></tr><tr><td>AssetIdentifier</td></tr></table> <table><tr><th>System</th></tr><tr><td>[System] Name</td></tr><tr><td>[System] Category</td></tr><tr><td>ComponentNames</td></tr><tr><td>[System] Description</td></tr></table> <table><tr><th>Assembly</th></tr><tr><td>[Assembly] Name</td></tr><tr><td>SheetName</td></tr><tr><td>ParentName</td></tr><tr><td>ChildNames</td></tr><tr><td>AssemblyType</td></tr><tr><td>[Assembly] Description</td></tr></table> <table><tr><th>Connection</th></tr><tr><td>[Connection] Name</td></tr><tr><td>ConnectionType</td></tr><tr><td>SheetName</td></tr><tr><td>RowName1</td></tr><tr><td>RowName2</td></tr><tr><td>RealizingElement</td></tr><tr><td>PortName1</td></tr><tr><td>PortName2</td></tr><tr><td>[Connection] Description</td></tr></table>	Component	[Component] Name	TypeName	Space	[Component] Description	SerialNumber	InstallationDate	WarrantyStartDate	TagNumber	BarCode	AssetIdentifier	System	[System] Name	[System] Category	ComponentNames	[System] Description	Assembly	[Assembly] Name	SheetName	ParentName	ChildNames	AssemblyType	[Assembly] Description	Connection	[Connection] Name	ConnectionType	SheetName	RowName1	RowName2	RealizingElement	PortName1	PortName2	[Connection] Description	<table><tr><th>Spare [Parts]</th></tr><tr><td>[Spare Part] Name</td></tr><tr><td>[Spare Part] Category</td></tr><tr><td>TypeName</td></tr><tr><td>Suppliers</td></tr><tr><td>[Spare Part] Description</td></tr><tr><td>SetNumber</td></tr><tr><td>PartNumber</td></tr></table> <table><tr><th>Resource</th></tr><tr><td>[Resource] Name</td></tr><tr><td>[Resource] Category</td></tr><tr><td>[Resource] Description</td></tr></table> <table><tr><th>Job [Plans]</th></tr><tr><td>[Job Plan] Name</td></tr><tr><td>[Job Plan] Category</td></tr><tr><td>Status</td></tr><tr><td>TypeName</td></tr><tr><td>Description</td></tr><tr><td>Duration</td></tr><tr><td>DurationUnit</td></tr><tr><td>Start</td></tr><tr><td>TaskStartUnit</td></tr><tr><td>Frequency</td></tr><tr><td>FrequencyUnit</td></tr><tr><td>TaskNumber</td></tr><tr><td>Priors</td></tr><tr><td>ResourceNames</td></tr></table> <table><tr><th>Impact</th></tr><tr><td>[Impact] Name</td></tr><tr><td>ImpactType</td></tr><tr><td>ImpactStage</td></tr><tr><td>SheetName</td></tr><tr><td>RowName</td></tr><tr><td>Value</td></tr><tr><td>ImpactUnit</td></tr><tr><td>LeadInTime</td></tr><tr><td>Duration</td></tr><tr><td>LeadOutTime</td></tr><tr><td>[Impact] Description</td></tr></table>	Spare [Parts]	[Spare Part] Name	[Spare Part] Category	TypeName	Suppliers	[Spare Part] Description	SetNumber	PartNumber	Resource	[Resource] Name	[Resource] Category	[Resource] Description	Job [Plans]	[Job Plan] Name	[Job Plan] Category	Status	TypeName	Description	Duration	DurationUnit	Start	TaskStartUnit	Frequency	FrequencyUnit	TaskNumber	Priors	ResourceNames	Impact	[Impact] Name	ImpactType	ImpactStage	SheetName	RowName	Value	ImpactUnit	LeadInTime	Duration	LeadOutTime	[Impact] Description	<table><tr><th>Contact</th></tr><tr><td>[Contact] Email [Address]</td></tr><tr><td>[Contact] Category</td></tr><tr><td>Company</td></tr><tr><td>Phone [Number]</td></tr><tr><td>Department</td></tr><tr><td>OrganizationCode</td></tr><tr><td>GivenName</td></tr><tr><td>FamilyName</td></tr><tr><td>Street</td></tr><tr><td>PostalBox</td></tr><tr><td>Town</td></tr><tr><td>StateRegion</td></tr><tr><td>PostalCode</td></tr><tr><td>Country</td></tr></table> <table><tr><th>Document</th></tr><tr><td>[Document] Name</td></tr><tr><td>[Document] Category</td></tr><tr><td>ApprovalBy</td></tr><tr><td>Stage</td></tr><tr><td>SheetName</td></tr><tr><td>RowName</td></tr><tr><td>Directory</td></tr><tr><td>File</td></tr><tr><td>[Document] Description</td></tr><tr><td>Reference</td></tr></table> <table><tr><th>Attribute</th></tr><tr><td>[Attribute] Name</td></tr><tr><td>[Attribute] Category</td></tr><tr><td>SheetName</td></tr><tr><td>RowName</td></tr><tr><td>Value</td></tr><tr><td>Unit</td></tr><tr><td>[Attribute] Description</td></tr><tr><td>AllowedValues</td></tr></table>	Contact	[Contact] Email [Address]	[Contact] Category	Company	Phone [Number]	Department	OrganizationCode	GivenName	FamilyName	Street	PostalBox	Town	StateRegion	PostalCode	Country	Document	[Document] Name	[Document] Category	ApprovalBy	Stage	SheetName	RowName	Directory	File	[Document] Description	Reference	Attribute	[Attribute] Name	[Attribute] Category	SheetName	RowName	Value	Unit	[Attribute] Description	AllowedValues	<table><tr><th>Coordinate</th></tr><tr><td>[Coordinate] Name</td></tr><tr><td>[Coordinate] Category</td></tr><tr><td>SheetName</td></tr><tr><td>RowName</td></tr><tr><td>CoordinateXAxis</td></tr><tr><td>CoordinateYAxis</td></tr><tr><td>CoordinateZAxis</td></tr><tr><td>ClockwiseRotation</td></tr><tr><td>ElevationRotation</td></tr><tr><td>YawRotation</td></tr></table> <table><tr><th>Issue</th></tr><tr><td>[Issue] Name</td></tr><tr><td>[Issue] Type</td></tr><tr><td>Risk</td></tr><tr><td>Chance</td></tr><tr><td>Impact</td></tr><tr><td>SheetName1</td></tr><tr><td>RowName1</td></tr><tr><td>SheetName2</td></tr><tr><td>RowName2</td></tr><tr><td>[Issue] Description</td></tr><tr><td>[Issue] Owner</td></tr><tr><td>Mitigation</td></tr></table>	Coordinate	[Coordinate] Name	[Coordinate] Category	SheetName	RowName	CoordinateXAxis	CoordinateYAxis	CoordinateZAxis	ClockwiseRotation	ElevationRotation	YawRotation	Issue	[Issue] Name	[Issue] Type	Risk	Chance	Impact	SheetName1	RowName1	SheetName2	RowName2	[Issue] Description	[Issue] Owner	Mitigation
Facility																																																																																																																																																																																					
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- The **data fields** in each COBie **data table** can be organized into a summary list that is meaningful to an owner (exclude the machine-readable fields).
- This list serves as a baseline to quickly define a fully **customized data set** that meets an owner's specific facility information requirements.

Sample Facility Information Scope - Extended

Spatial Information	Asset (Equipment) Information	O & M Information	Reference Information																																											
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- ✓ Required COBie data fields **unnneeded by the owner** may have a value of “n/a.”

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Sample Facility Information Scope - Extended

Spatial Information	Asset (Equipment) Information	O & M Information	Reference Information																																											
<table><tr><th>Facility</th></tr><tr><td>x [Facility] Name</td></tr><tr><td>x [Facility] Category</td></tr><tr><td>x ProjectName</td></tr><tr><td>x SiteName</td></tr><tr><td>x LinearUnit</td></tr><tr><td>x AreaUnits</td></tr><tr><td>x VolumeUnits</td></tr><tr><td>x CurrencyUnit</td></tr><tr><td>x AreaMeasurement</td></tr><tr><td>x OwnerDefined</td></tr><tr><td>x OwnerDefined</td></tr><tr><td>x OwnerDefined</td></tr></table>	Facility	x [Facility] Name	x [Facility] Category	x ProjectName	x SiteName	x LinearUnit	x AreaUnits	x VolumeUnits	x CurrencyUnit	x AreaMeasurement	x OwnerDefined	x OwnerDefined	x OwnerDefined	<table><tr><th>[Asset] Type</th></tr><tr><td>x [Type] Name</td></tr><tr><td>x [Type] Category</td></tr><tr><td>x [Type] Description</td></tr><tr><td>x AssetType</td></tr><tr><td>x Manufacturer</td></tr><tr><td>x ModelNumber</td></tr><tr><td>x WarrantyGuarantorParts</td></tr><tr><td>x WarrantyDurationParts</td></tr><tr><td>x WarrantyGuarantorLabor</td></tr><tr><td>x WarrantyDurationLabor</td></tr><tr><td>x WarrantyDurationUnit</td></tr><tr><td>x OwnerDefined</td></tr><tr><td>x OwnerDefined</td></tr></table>	[Asset] Type	x [Type] Name	x [Type] Category	x [Type] Description	x AssetType	x Manufacturer	x ModelNumber	x WarrantyGuarantorParts	x WarrantyDurationParts	x WarrantyGuarantorLabor	x WarrantyDurationLabor	x WarrantyDurationUnit	x OwnerDefined	x OwnerDefined	<table><tr><th>Component</th></tr><tr><td>x [Component] Name</td></tr><tr><td>x TypeName</td></tr><tr><td>x Space</td></tr><tr><td>x [Component] Description</td></tr><tr><td>x SerialNumber</td></tr><tr><td>x InstallationDate</td></tr><tr><td>x WarrantyStartDate</td></tr><tr><td>x OwnerDefined</td></tr><tr><td>x OwnerDefined</td></tr><tr><td>x OwnerDefined</td></tr></table>	Component	x [Component] Name	x TypeName	x Space	x [Component] Description	x SerialNumber	x InstallationDate	x WarrantyStartDate	x OwnerDefined	x OwnerDefined	x OwnerDefined	<table><tr><th>Contact</th></tr><tr><td>x [Contact] Email [Address]</td></tr><tr><td>x [Contact] Category</td></tr><tr><td>x Company</td></tr><tr><td>x Phone [Number]</td></tr></table>	Contact	x [Contact] Email [Address]	x [Contact] Category	x Company	x Phone [Number]
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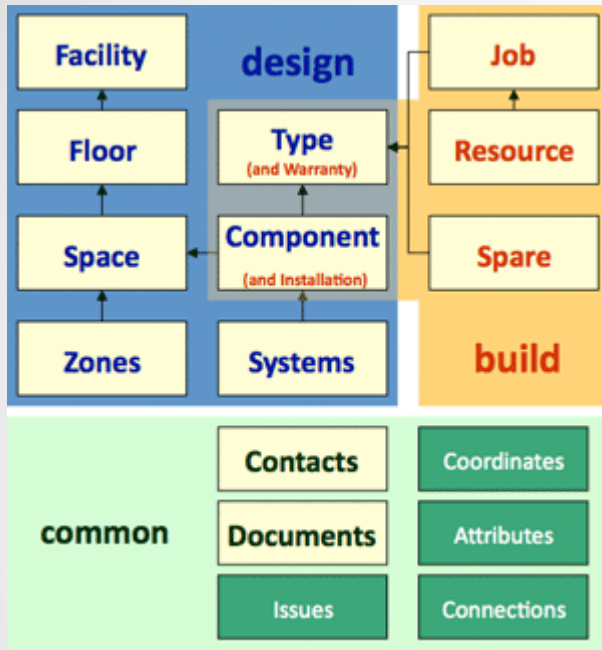
- ✓ The final scope conforms both COBie **and** to the Owner’s proprietary information requirements.
- ✓ Only information **required by Owner** is extracted from model.
- ✓ The scope is **clear to all parties** in mitigating risk, minimizing cost and eliminating potential misunderstandings.
- ✓ The deliverable is **facility information**; not an “as-built record model.”

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Naming Conventions:

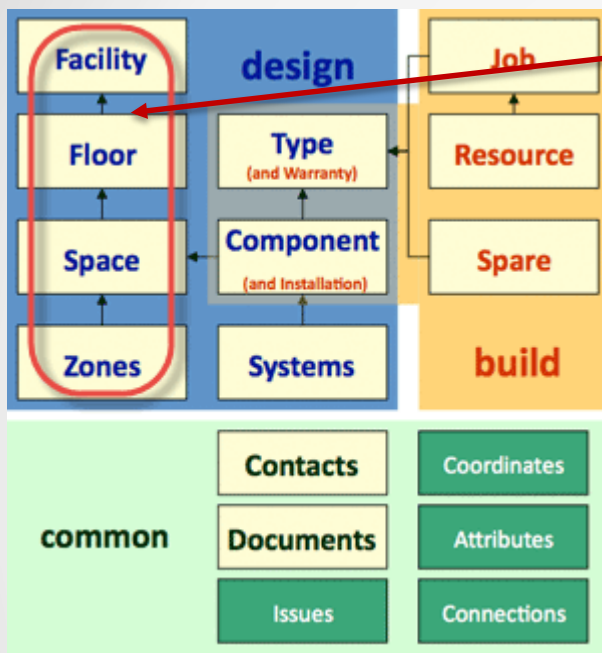
- Together with the Owner's **facility management team**, develop a **naming convention** for each building component or piece of equipment.
- Our recommended **naming convention** “concatenates” the facility, floor, and asset type names to create a unique name for each physical asset:
 - **120Bdwy-Penthouse-AHU1**
 - **14Wall-Flr7-Rm745-FlrFnsh**
 - **75Federal-Roof-ExhaustFan1-3000CFM**
- Other naming conventions are possible; the goal is a naming convention that is simple, clear, self-explanatory, and easily added to.

Progressive Data Delivery: Who delivers what, when?



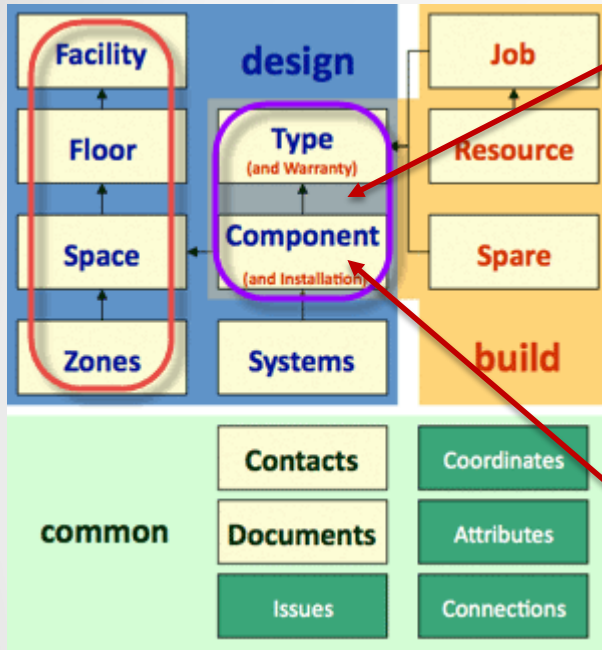
- The **Facility Information Specification** defines which party is responsible for delivering which pieces of information, and on what schedule.
- Facility information delivery is timed to coincide with **traditional contract deliverables**.
- **Responsibility** for facility information is **aligned** with traditional contractual deliverables.

Progressive Data Delivery



When the architectural design and the size and arrangement of spaces are finalized and approved, the architect submits the **facility spatial information** as an integral part of the contract documents.

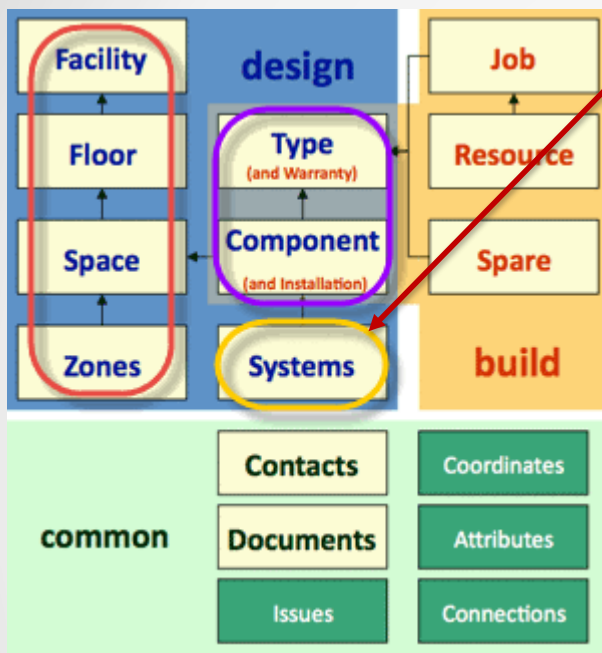
Progressive Data Delivery



When the design of **buildings components** (e.g., doors, windows, flooring, curtain wall systems) and **MEP systems** is approved, the design team submits **general information** about finishes, components, and equipment (traditionally documented in finish, product, and equipment schedules).

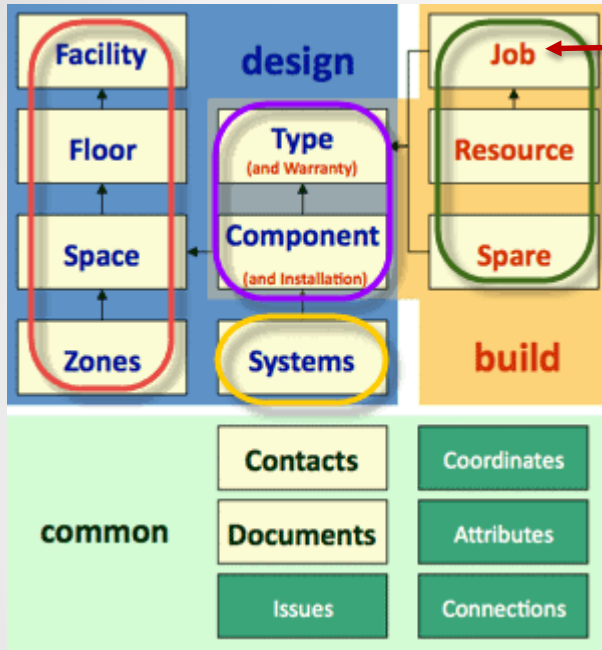
As part of the submittals for building components and MEP equipment, the GC/CM submits **detailed information** such as manufacturer and model number (traditionally documented in product data sheets).

Progressive Data Delivery



Information about how individual building **components** or **equipment** comprise specific **building systems** is also documented, either as part of the GC/CMs submittal process or as part of the building commissioning process.

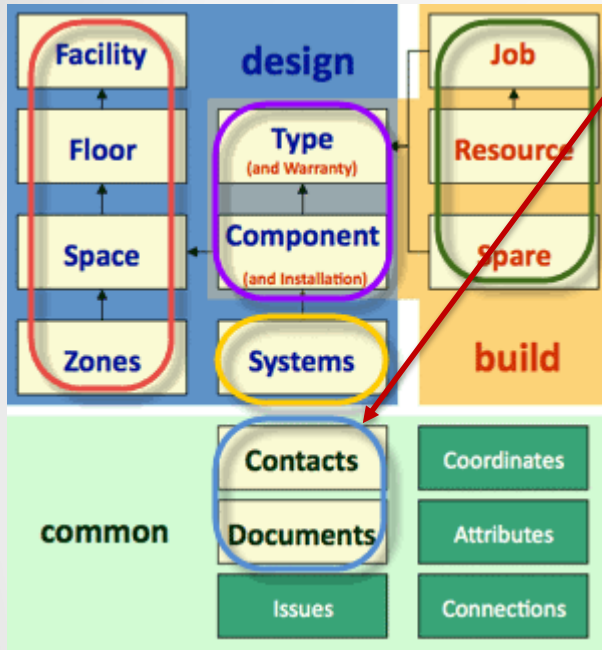
Progressive Data Delivery



As the owner's engineering team mobilizes to operate the building, information needed to support **long-term facility operations** is systematically collected as part of the commissioning process, including.

- General Preventative Maintenance (PM) information.
- Required maintenance materials, tools, and training info.
- Required on-site spare and replacement parts.
- Equipment start-up and shutdown procedures.
- Emergency plans.
- Original Construction PM, Safety, and other Job Plans (optional; for archival / reference purposes).

Progressive Data Delivery



Throughout the process, specified **contact information** and **reference documents** are submitted by the responsible parties, linked to the submitted building information.

- **Clarity of the Facility Information Specification** and **alignment** of facility information delivery with **traditional contractual deliverables** reduces perceived risk and cost for A/Es, GC/CMs – and the owner.

Planning for Successful BIM2FM Delivery:

Assess:

- The owner's existing software systems, business processes, workflow.

Evaluate:

- Whether and how a COBie-compliant Facility Information Specification can be developed to meet the needs of the owner and the project.

Develop:

- A customized **Facility Information Specification** for the project.

Advise:

- The owner on how to incorporate the FIS into A/E and GC/CM contracts.

Deliver:

- A **data set** that satisfies the Facility Information Specification.

Benefits to building owners (selling points):

- Owners can define and receive **the information they need** to manage and operate their buildings on “Day One” of occupancy, with no lengthy (and incomplete) post-occupancy data collection.
- Owners can get all the information they **are already receiving** in an intelligent, electronic form that they can actually use to operate and maintain their buildings.
- Owners can continue to use their existing FM and O&M software systems, workflow, and procedures; **no new technology to buy, learn, or implement.**

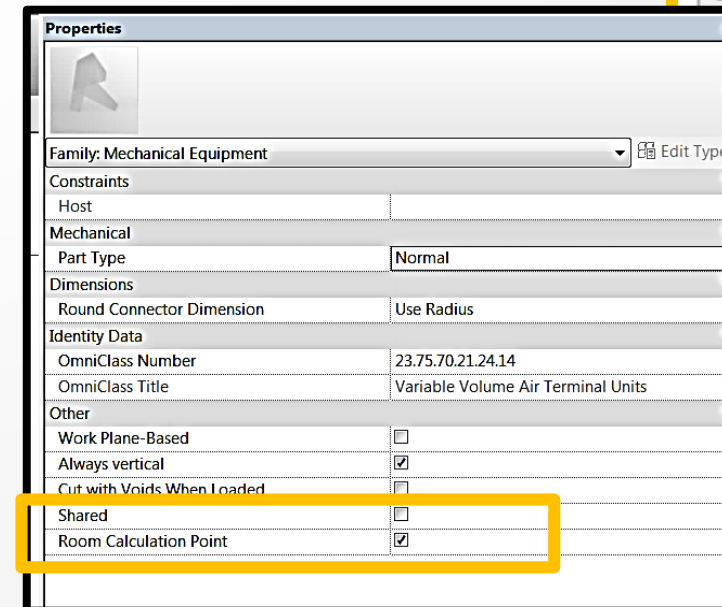
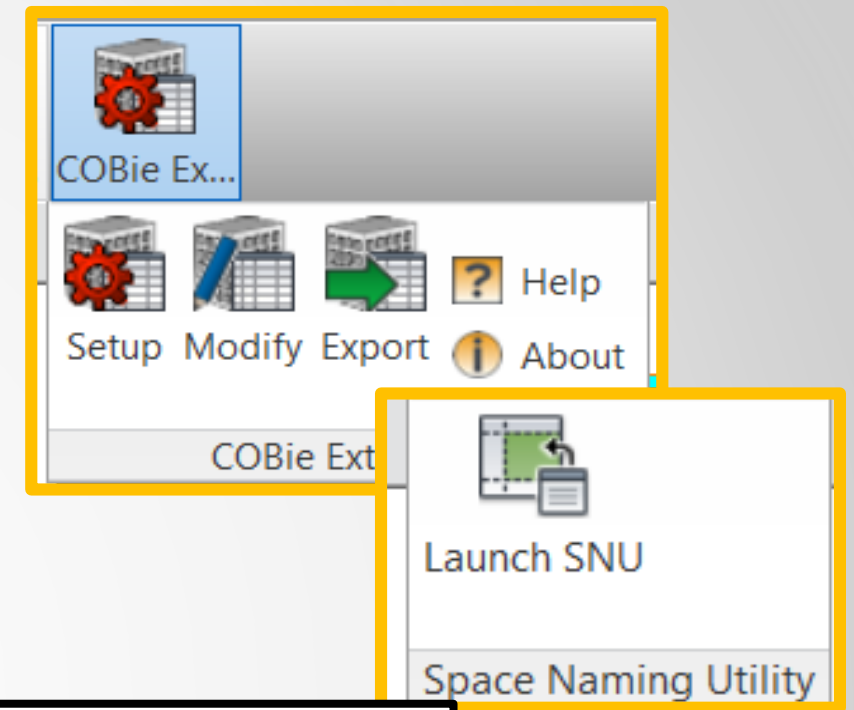
COBIE in Revit 2014: Tips and Tricks

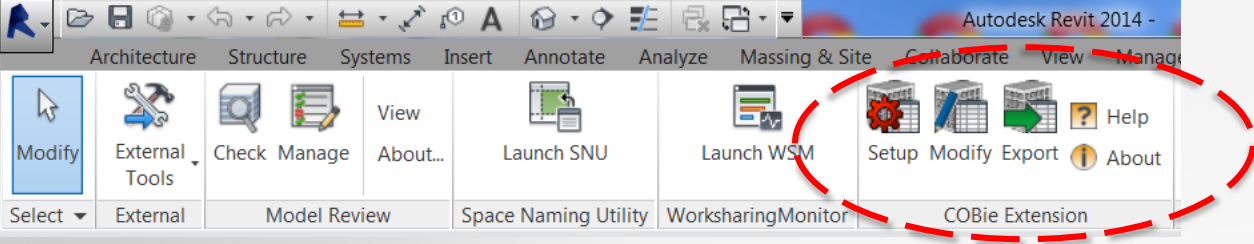


COBie in Revit

Tricks and Tips

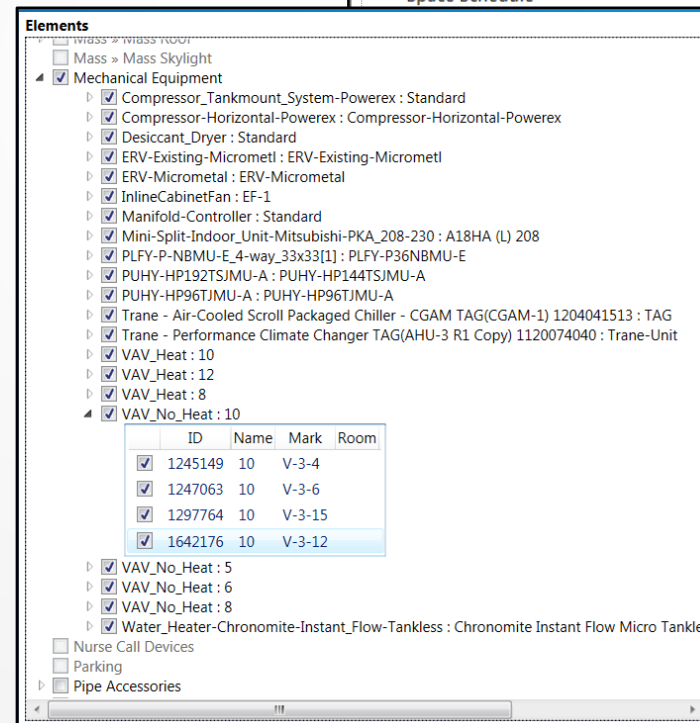
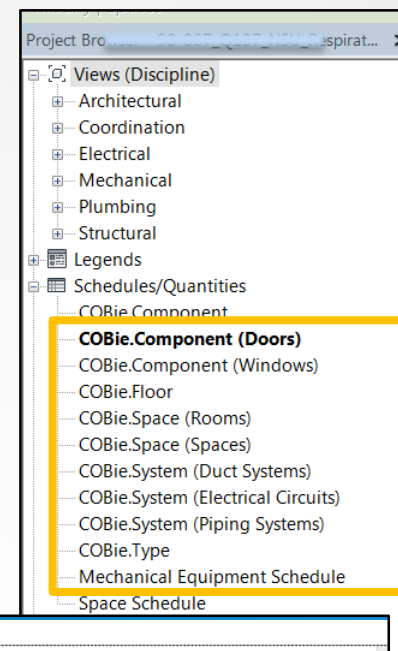
- COBie for Revit Add-Ins:
 - ✓ **COBie Extension for Revit**
 - ✓ **Space Naming Utility (SNU)**
- **Phasing**
 - ✓ New Construction
- **Exporting**
 - ✓ Appending
- **Room Calculation Point**
 - ✓ Locates “orphaned” assets:
 - Interstitial / Above Ceiling
 - Room-less Assets

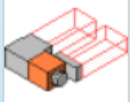




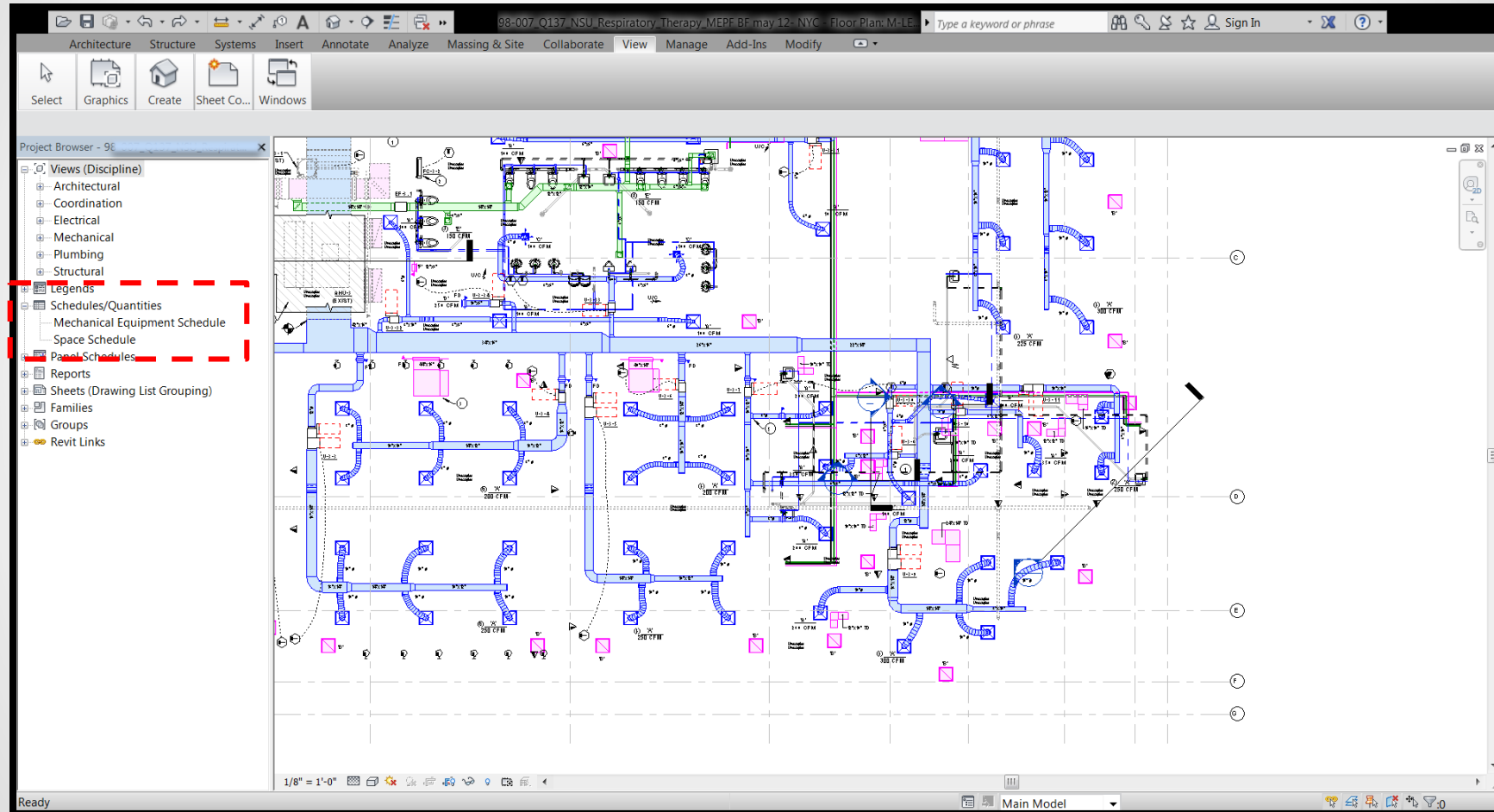
COBie Extension for Revit :

- Creates **COBie schedules** so that data can be properly organized for export.
- Creates **COBie property sets** (data fields) via shared parameter file.
- Creates project asset type lists.

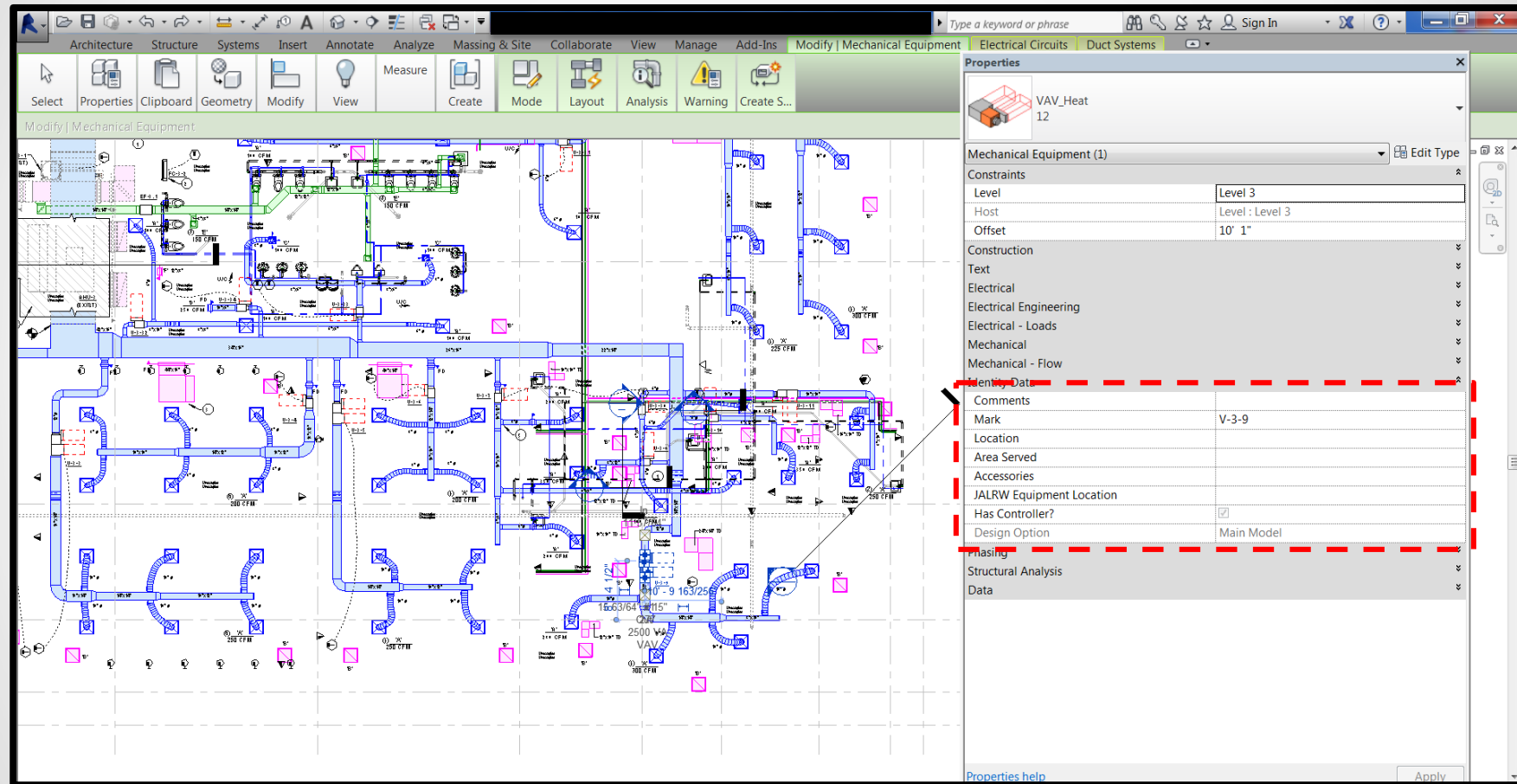


 VAV_Heat 12	
JAL Exhaust Fan Power	
JAL Is Existing	☒
JAL Pump Speed	
JAL Cooling Capacity	
JAL Refrigerant Used	
JAL Circuit Number	
JAL Panel	
COBie	☒
COBie.CreatedBy	bfoster@vdcotech.com
COBie.CreatedOn	2014-05-12T02:39:10
COBie.Component.Name	V-3-9
COBie.Component.Space	
COBie.Component.Descripti...	
COBie.Component.SerialNu...	
COBie.Component.Installati...	
COBie.Component.Warranty...	
COBie.Component.TagNum...	
COBie.Component.BarCode	
COBie.Component.AssetId...	
COBie.Component.Area	

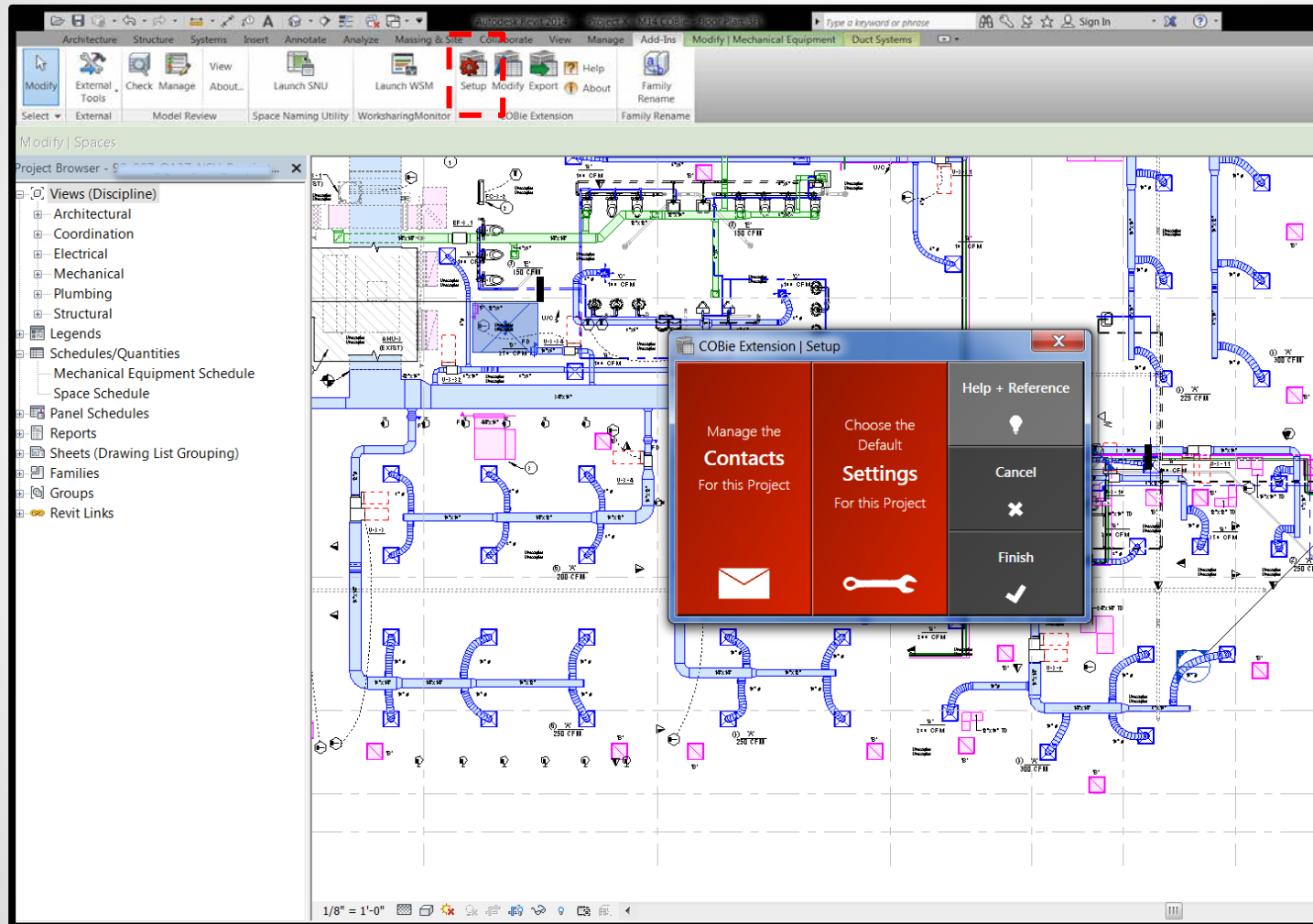
COBie Extension for Revit 2014:



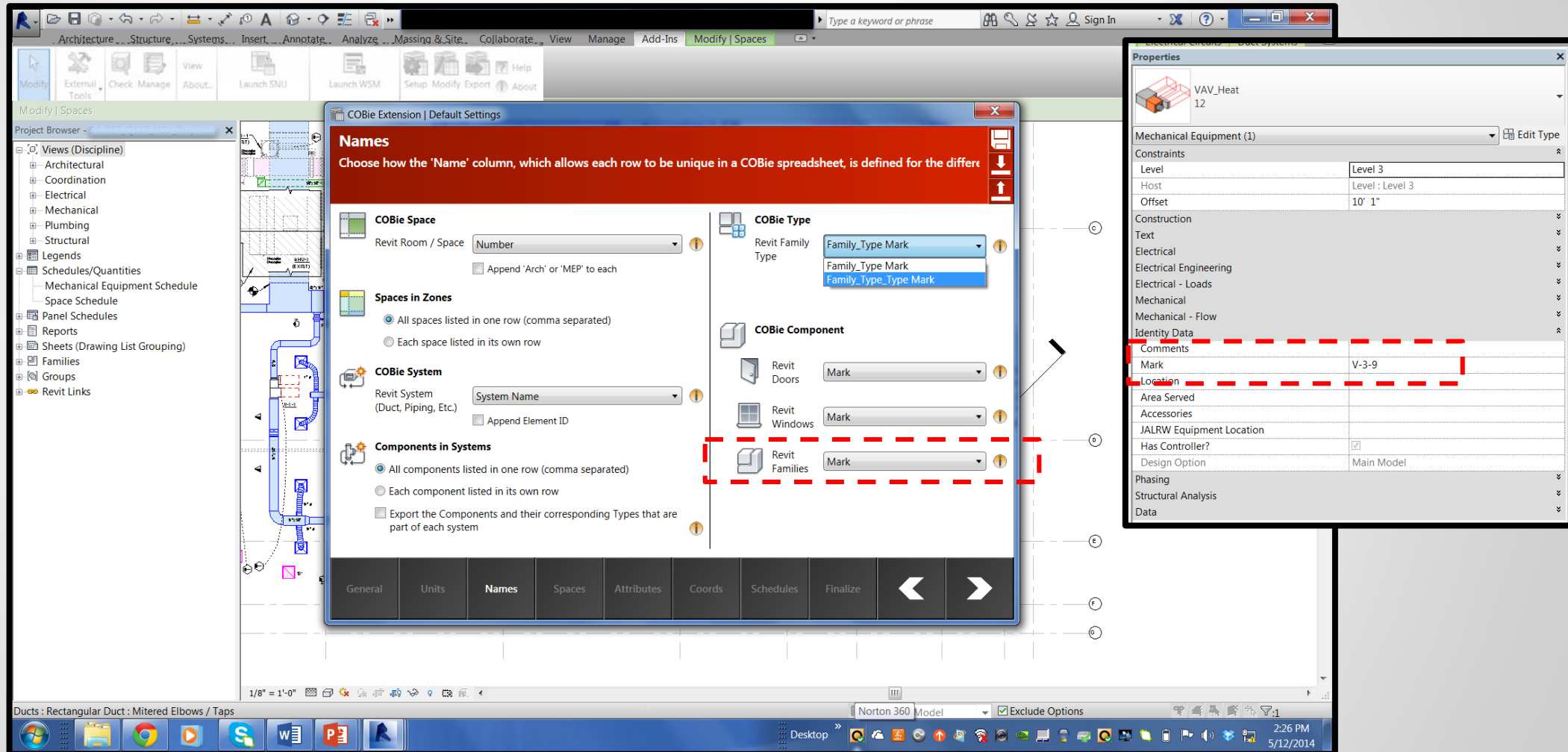
COBie Extension for Revit 2014:



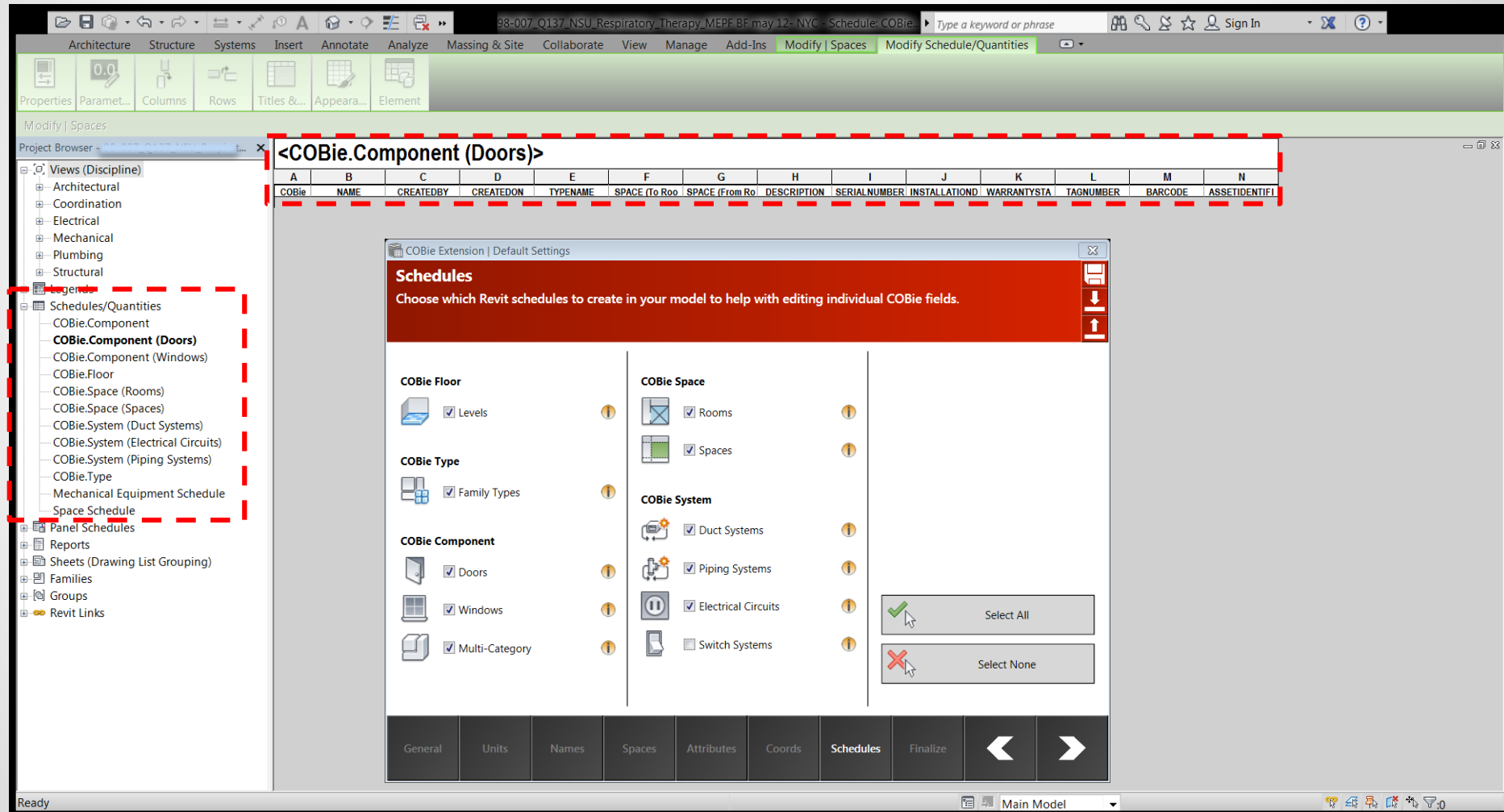
COBie Extension for Revit 2014:



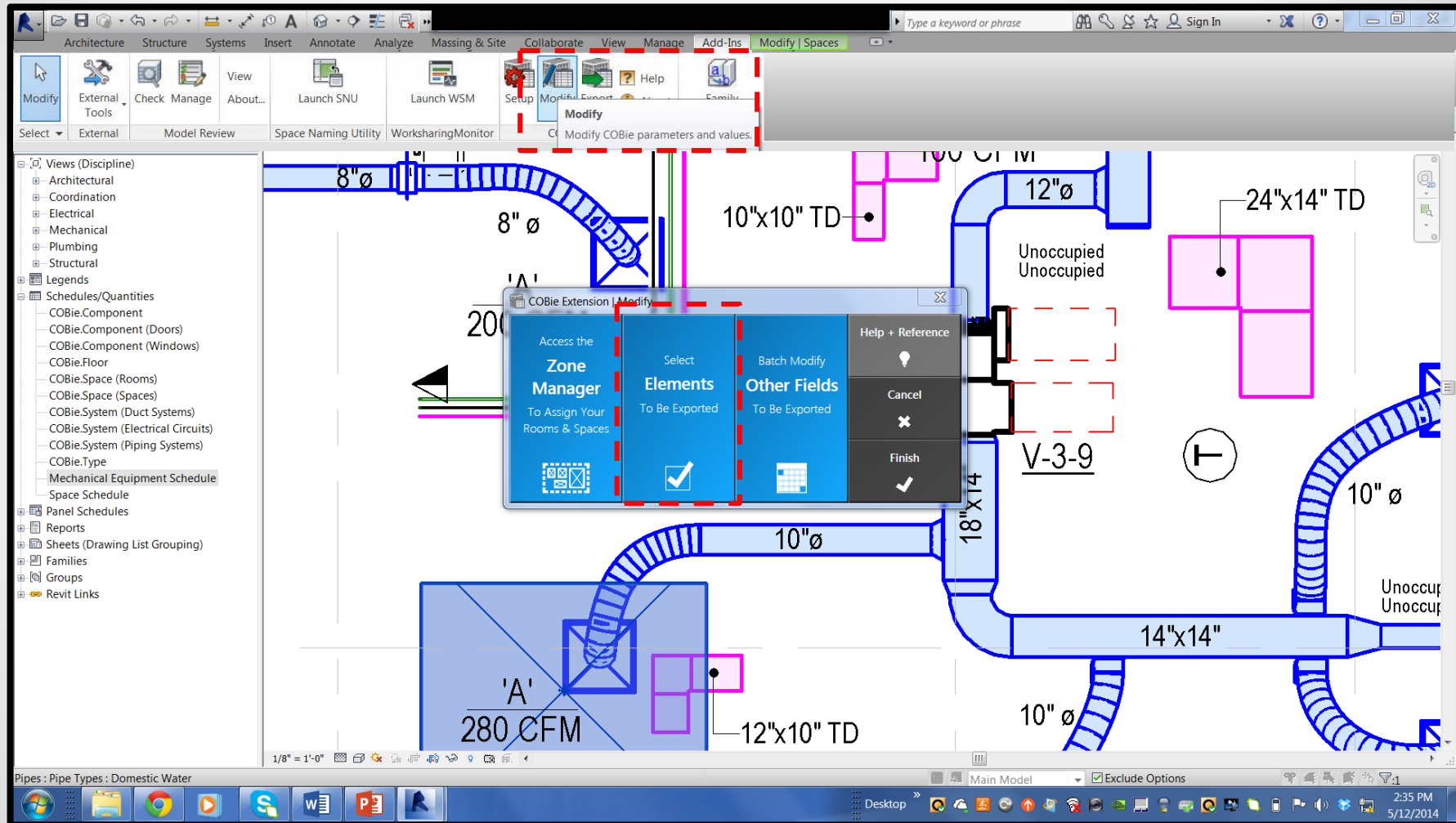
COBie Extension for Revit 2014:



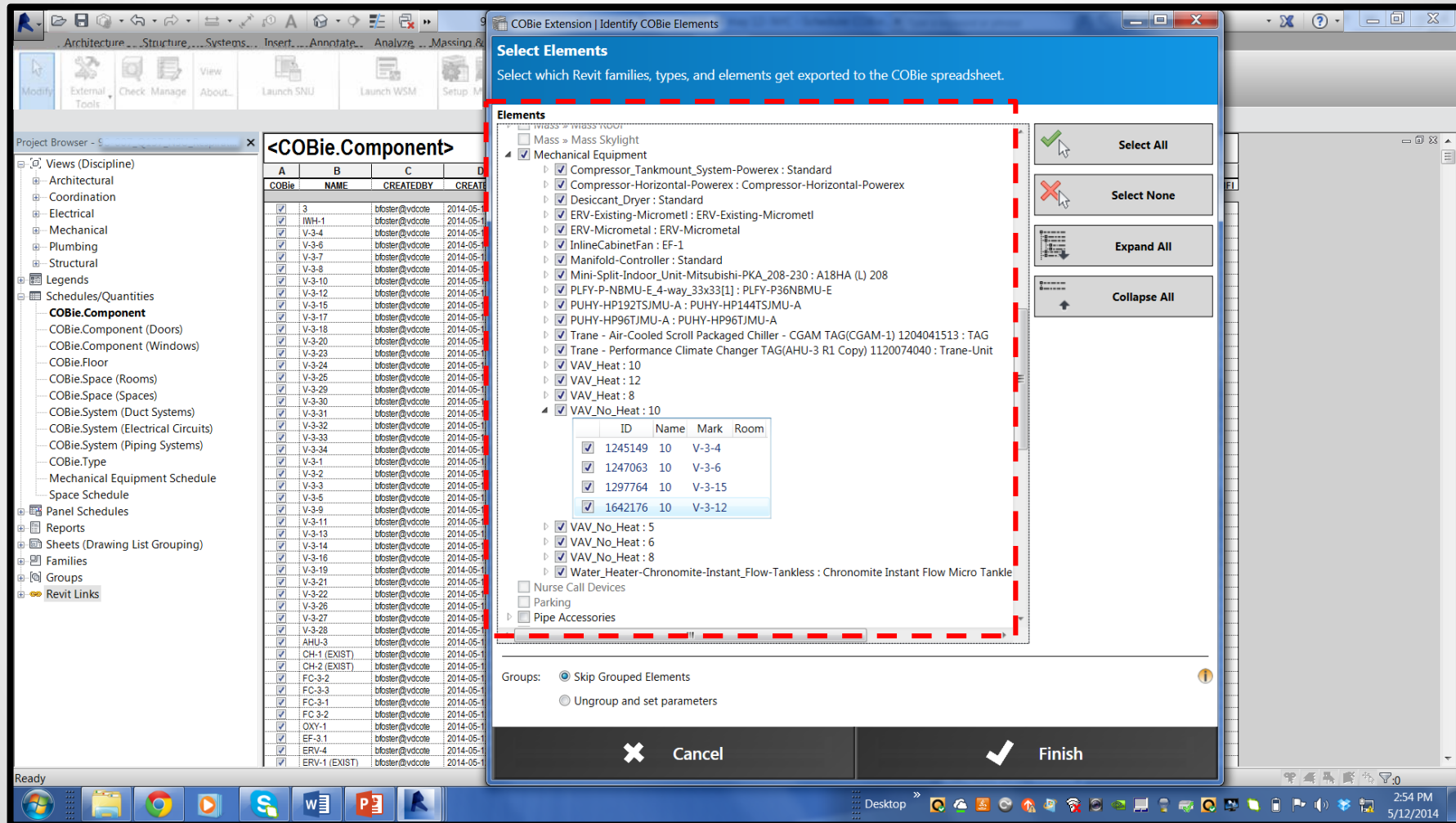
COBie Extension for Revit 2014:



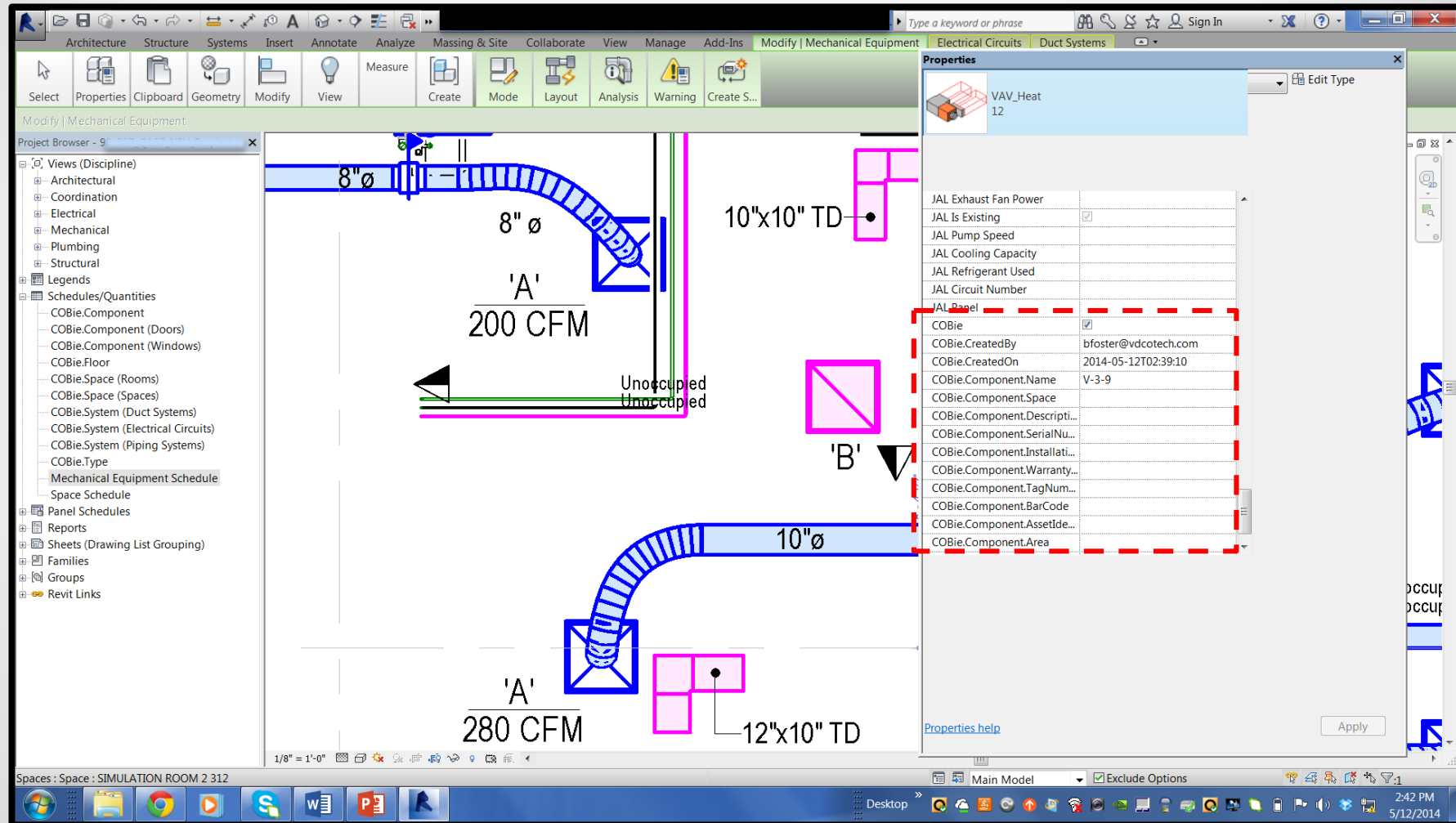
COBie Extension for Revit 2014:



COBie Extension for Revit 2014:



COBie Extension for Revit 2014:



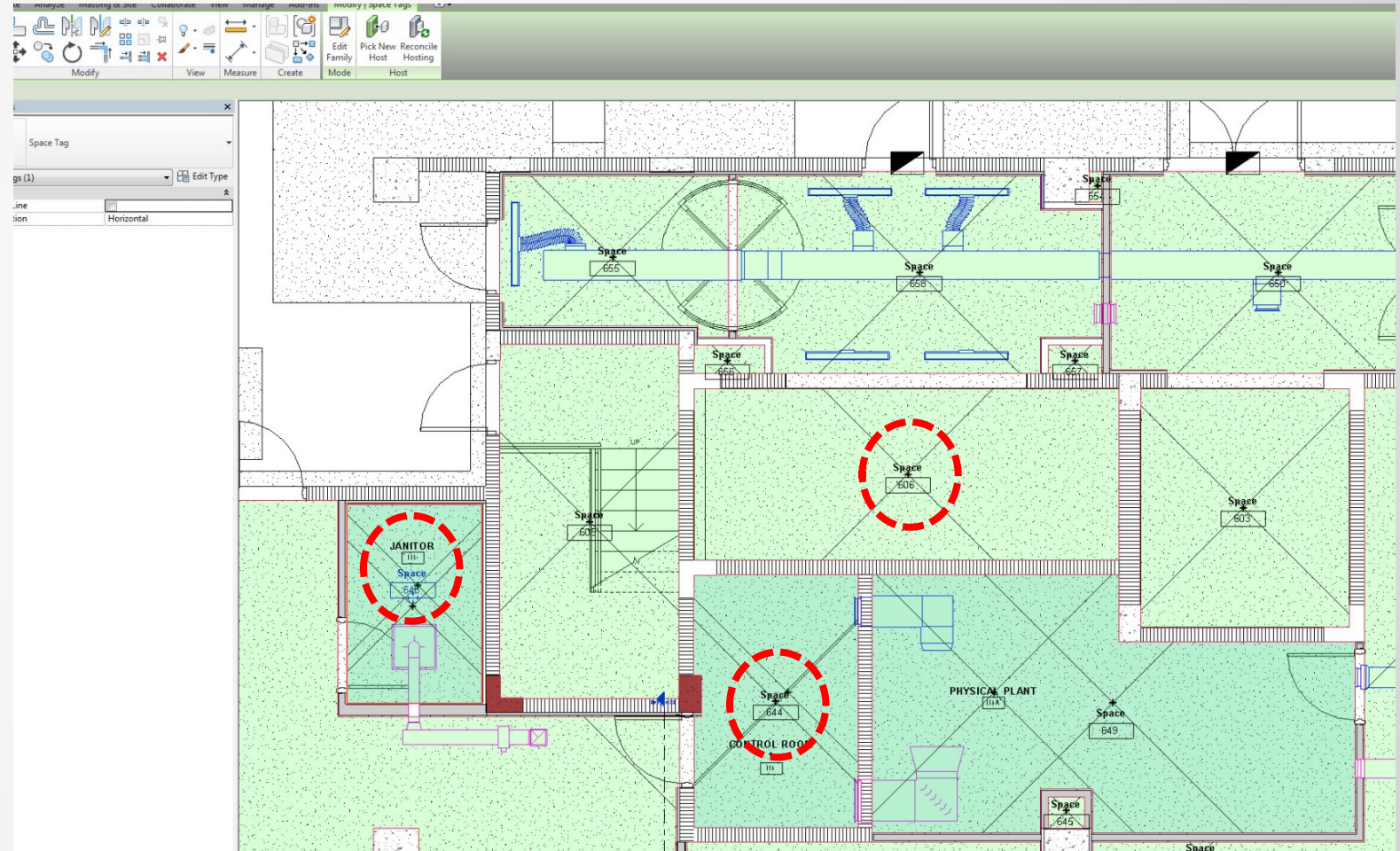
COBie Extension for Revit 2014:

The screenshot displays the Revit 2014 software interface. The main window shows a schedule titled "<COBie.Component>". The schedule table has columns A through N, with headers: COBie, NAME, CREATEDBY, CREATEDON, TYPENAME, SPACE (Room), SPACE (Space), DESCRIPTION, SERIALNUMBER, INSTALLATION, WARRANTYSTA, TAGNUMBER, BARCODE, and ASSETIDENTIFI. The table contains numerous rows of data, including components like V-3-1 through V-3-28, AHU-3, CH-1 (EXIST), CH-2 (EXIST), FC-3-2, FC-3-3, FC-3-1, FC-3-2, OKY-1, EF-3-1, ERV-4, and ERV-1 (EXIST).

On the left side, the Project Browser shows the hierarchy of the project, including Views (Discipline), Schedules/Quantities, and Reports. The Schedules/Quantities folder is expanded, showing the COBie.Component schedule.

A "Schedule Properties" dialog box is open in the foreground, showing the "Filter" tab. The "Filter by:" dropdown is set to "COBie" and the "Filter" dropdown is set to "equals". The "And:" dropdown is set to "(none)".

Revit Space Naming Utility:



Space Name = Room Name

Revit Space Naming Utility:

- Copies values from the Revit **<Room Name>** data field to the COBie **<Space.Name>** data field.

<Space Schedule>					
A	B	C	D	E	F
Number	Name	Area	Level	Room Number	Room Name
125	MAIN ELEC ROOM	Not Placed	Not Placed		
344	TRAVELING OFFICE	Not Placed	Not Placed		
C207	Space	Not Placed	Not Placed		
C301	WEST LOBBY	Not Placed	Not Placed		
S101	STAIR 01	Not Placed	Not Placed		
Not Placed					
100	GENERAL SEATING	7064 SF	1FL	100	GENERAL SEATING
101	TEL/DATA	125 SF	1FL	101	TEL/DATA
102	OFFICE	100 SF	1FL	102	OFFICE
103	MEN	252 SF	1FL	103	MEN
104	WOMEN	276 SF	1FL	104	WOMEN
105	JAN	46 SF	1FL	105	JAN
106	TACO BELL	973 SF	1FL	106	TACO BELL
107	FUTURE FOOD VENDOR	931 SF	1FL	107	FUTURE FOOD VENDOR
108	PANDA EXPRESS	497 SF	1FL	108	PANDA EXPRESS
109	CLOSET	36 SF	1FL	109	CLOSET
111	STARBUCKS	2042 SF	1FL	111	STARBUCKS
120	CATERING KITCHEN	491 SF	1FL	120	CATERING KITCHEN
121	DOMESTIC WATER PUMP ROO	71 SF	1FL	121	DOMESTIC WATER PUMP ROOM
122	LOADING/STAGING AREA	277 SF	1FL	122	LOADING/STAGING AREA
123	CHILLED WATER PUMP ROOM	264 SF	1FL	123	CHILLED WATER PUMP ROOM
124	FIRE PUMP ROOM	184 SF	1FL	124	FIRE PUMP ROOM
126	WATER HEATER ROOM	82 SF	1FL	126	WATER HEATER ROOM
127	EMERGENGY POWER	51 SF	1FL	127	EMERGENGY POWER
C100	ELEV LOBBY	307 SF	1FL	C100	ELEV LOBBY
C102	CORRIDOR	190 SF	1FL	C102	CORRIDOR
C103	CORRIDOR	473 SF	1FL	C103	CORRIDOR
E100	ELEV	148 SF	1FL	E100	ELEV
S102	STAIR 02	273 SF	1FL	S102	STAIR 02
1FL_23					
201	MEDIA CLOSET	101 SF	2FL	201	MEDIA CLOSET
202	TEL/DATA	110 SF	2FL	202	TEL/DATA
203	ELEC ROOM	99 SF	2FL	203	ELEC ROOM
204	JAN	58 SF	2FL	204	JAN
205	MEN	188 SF	2FL	205	MEN
206	WOMEN	202 SF	2FL	206	WOMEN
210	FACULTY LOUNGE	525 SF	2FL	210	FACULTY LOUNGE
210A	KITCHENETTE	147 SF	2FL	210A	KITCHENETTE
210C	VESTIBULE	50 SF	2FL	210C	VESTIBULE
211	TRAVELING OFFICE	81 SF	2FL	211	TRAVELING OFFICE
212	TRAVELING OFFICE	80 SF	2FL	212	TRAVELING OFFICE
213	TRAVELING OFFICE	85 SF	2FL	213	TRAVELING OFFICE
214	CLASSROOM (FLAT)	1118 SF	2FL	214	CLASSROOM (FLAT)

Revit Room Calculation Point:

Properties

VAV_Heat
12

Mechanical Equipment (1)

Constraints

Construction

Text

Electrical

Number of Poles

Heating Capacity (kW) 1500.00 W

Frequency

Electrical Engineering

Voltage

Electrical - Loads

Panel H3A

Circuit Number 17

Starter Furnished by

Fan Motor HP (Non Overload)

Mechanical

Mechanical - Flow

Minimum Primary Airflow 450.00 CFM

Inlet Airflow 0.00 CFM

Heating Airflow 500.00 CFM

Discharge Airflow 1500.00 CFM

Actual Return Air Flow

Actual Exhaust Air Flow

Fan Total Air

Maximum Primary Airflow 1500.00 CFM

Actual Outside Air Flow

Pressurization

Supply Total Static Pressure

Identity Data

Comments

Mark V-3-3

Location

Area Served

Accessories

Has Controller? ☒

Design Option Main Model

Phasing

Structural Analysis

Operating Weight

Data

JAL Apparent Load 3500.00 VA

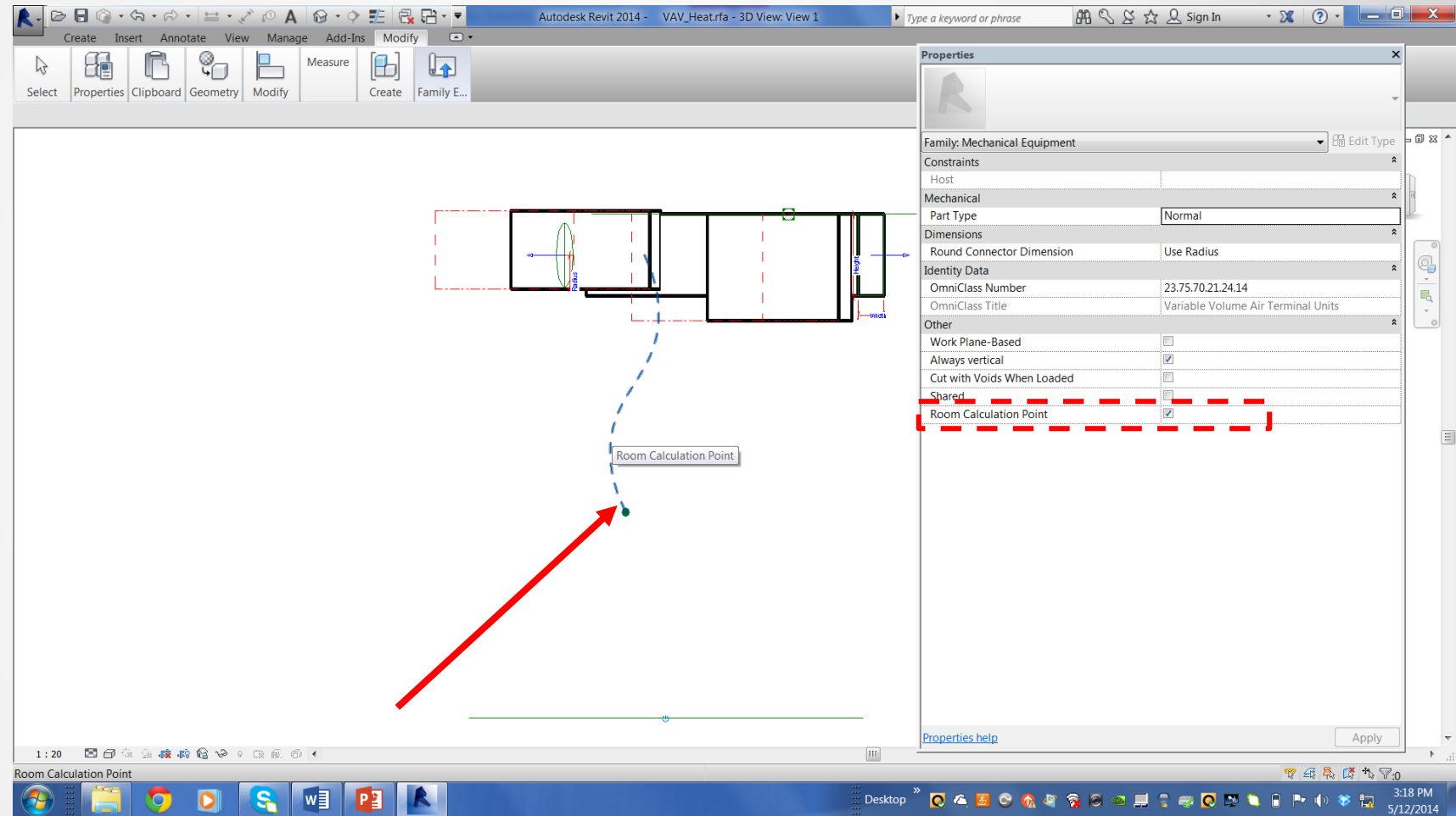
Pump Speed

VAV
3500 VA
In277
In 37.84

EXIT

8' - 5"

Revit Room Calculation Point:



Revit Room Calculation Point:

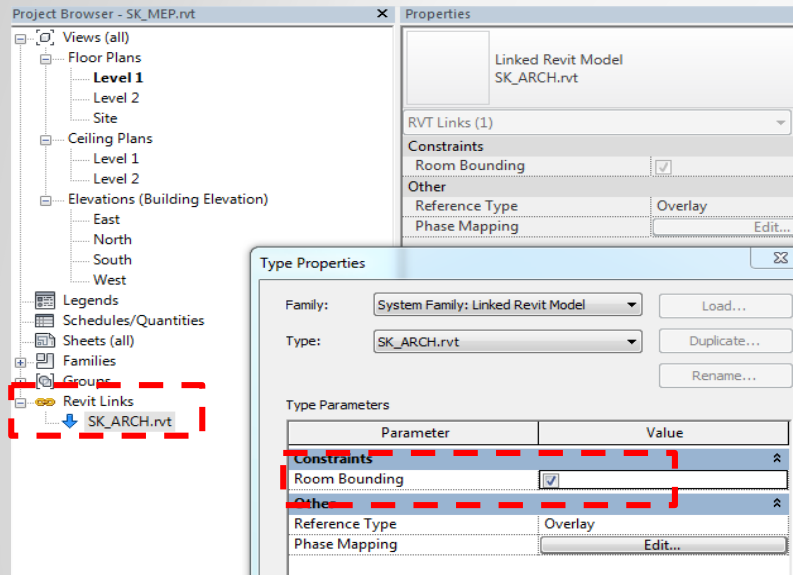
The image displays the Revit Properties window on the left and a 2D floor plan view on the right. A red arrow points from the 'COBie Component Name' field in the Properties window to a VAV unit in the floor plan.

Properties Window - VAV_Heat 12

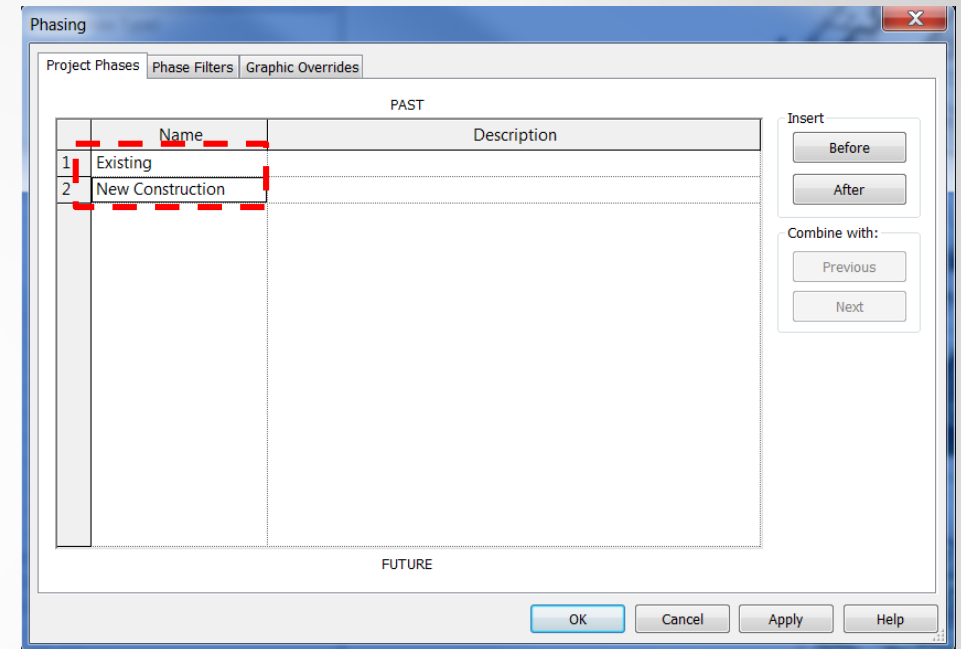
Category	Property	Value	
Mechanical Equipment (1)	Constraints		
	Construction		
	Text		
	Electrical Engineering		
Voltage			
Electrical - Loads	Panel	H3A	
	Circuit Number	17	
	Starter Furnished by		
	Fan Motor HP (Non Overload)		
Mechanical - Flow	Minimum Primary Airflow	450.00 CFM	
	Inlet Airflow	0.00 CFM	
	Heating Airflow	500.00 CFM	
	Discharge Airflow	1500.00 CFM	
	Actual Return Air Flow		
	Actual Exhaust Air Flow		
	Fan Total Air		
	Maximum Primary Airflow	1500.00 CFM	
	Actual Outside Air Flow		
	Pressurization		
	Supply Total Static Pressure		
	Identity Data	Comments	
		Mark	V-3-3
		Location	
Area Served			
Accessories	Has Controller?	☒	
	Design Option	Main Model	
Phasing	Structural Analysis		
	Data		
	JAL Apparent Load	3500.00 VA	
	Pump Speed		
	COBie	☒	
	COBie.CreatedBy	psukphisit@beta.com	
	COBie.CreatedOn	2014-05-13T12:24:11	
	COBie.Component.Name	V-3-3	
	COBie.Component.Space	302_COMPUTER LAB	
	COBie.Component.Description		
	COBie.Component.SerialNu...		
	COBie.Component.Installatio...		
	COBie.Component.Manufacturer		
	COBie.Component.TagNum...		
	COBie.Component.BarCode		
	COBie.Component.AssetIden...		
	COBie.Component.Area		
	COBie.Component.Length		

Floor Plan View: The view shows a room with green walls and a ceiling with a VAV unit (3500 VA, In 277, 14-67/90). The unit is connected to a duct system. A red dashed box highlights the unit and its connection. A red arrow points from the 'COBie Component Name' field in the Properties window to the VAV unit. The room contains several desks with computers and chairs. An 'EXIT' sign is visible on the wall.

Revit Links : Room Bounding



Revit Phasing : New Construction



IMPORTANT TO CHECK

Revit Export

Mechanical – Basis
Append :
Plumbing
Electrical
Architectural
Fire Protection

COBie Extension | Export

Export
Choose your final options and then export to a COBie spreadsheet.

Select Worksheets

- ☒ Contact
- ☐ Facility
- ☐ Floor
- ☐ Space
- ☒ Zone
- ☒ Type
- ☒ Component
- ☒ System
- ☒ Attribute
- ☒ Coordinate

Choose an Action

☐ Create New

☒ Append Existing

Export to a File

C:\Users\Birg\OneDrive\VDCO Projects\COBie Deliverable ...

Cancel Export

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<http://www.caddmicrosystems.com/industry-solution/cobie-extension-revit>

BIM Interoperability

Autodesk supports BIM interoperability

Autodesk's work on our data exchange protocols underscores our ongoing commitment to support industry Building Information Modeling (BIM) interoperability standards and open source data exchange methodologies.

- Autodesk created IFC Open Source export for Revit in 2011, which has been downloaded more than 30,000 times by users from more than 100 countries.
- We have contributed at least 24 updates to the IFC export capabilities and have updated the IFC open source 26 times.
- The Green Building XML (gbXML) schema used in several Autodesk products—including Revit software products, AutoCAD verticals, Ecotect Analysis software, Green Building Studio® web-based energy analysis service, and Vasari software—was developed in 1999 to facilitate the interoperability between information stored in BIM models and a wide variety of engineering analysis tools to support green building design, analysis, and operating workflows. [Find a supporting gbXML](#).

COBie Toolkit for Revit
2015, 2014, 2013, 2012, 2011



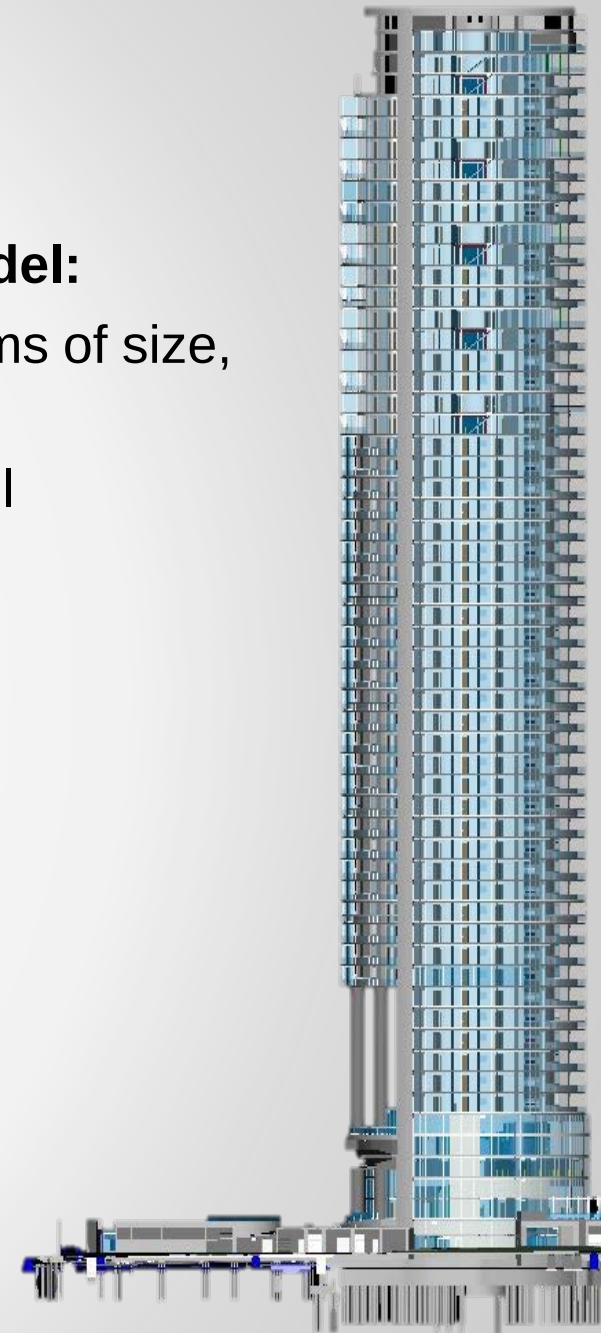
<http://www.autodesk.com/campaigns/interoperability>

Insights from real-world BIM2FM implementations



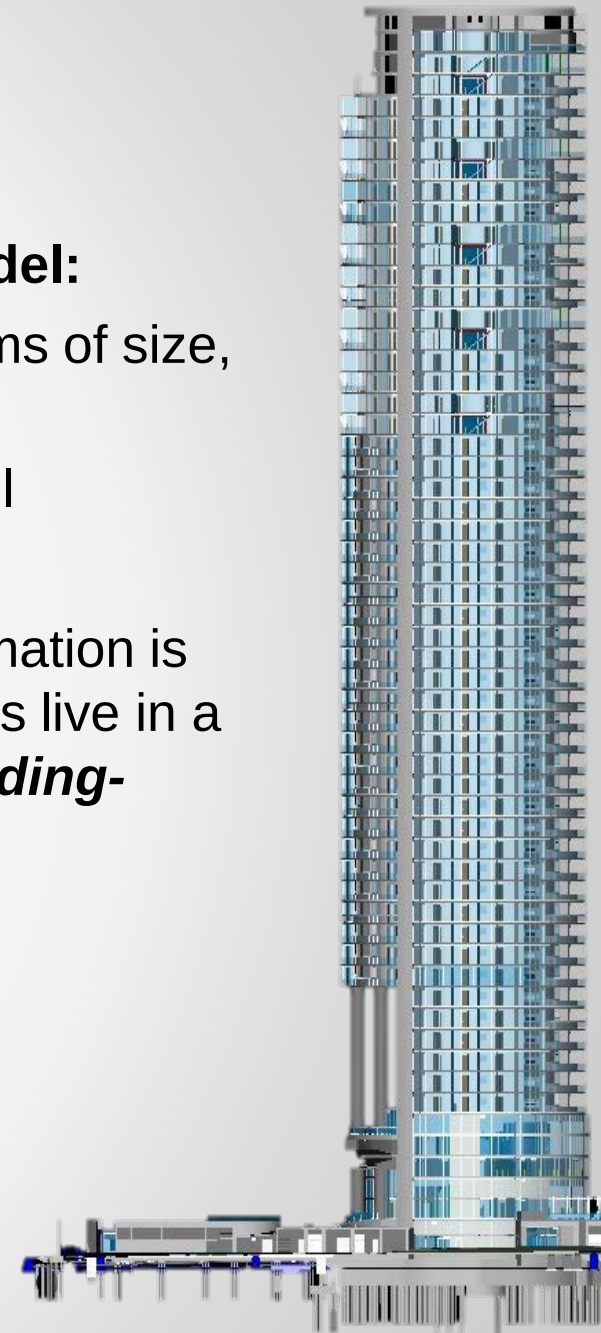
Insights from experience:

1. A **BIM2FM deliverable** is not equivalent to an **LOD 500 model**:
“The Model Element is a ***field verified*** representation in terms of size, shape, location, quantity, and orientation.
Non-graphic information ***may also be attached*** to the Model Elements.”



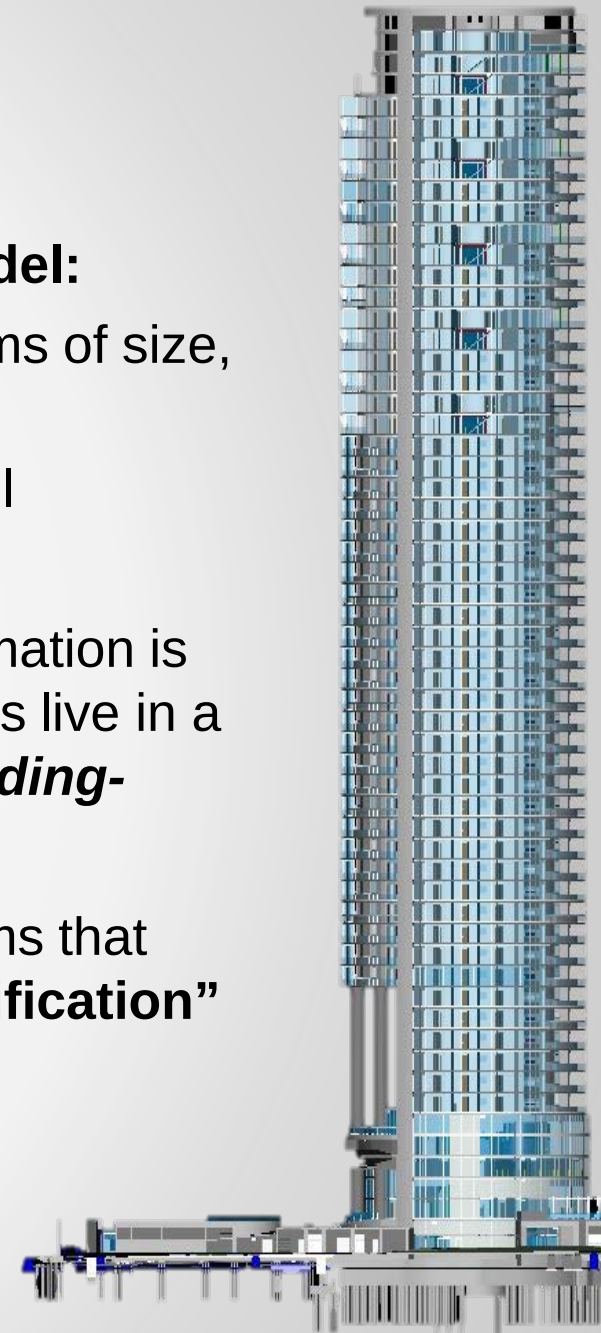
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2. Project team members live in a ***project-centric*** world; information is stored in a ***project-based*** system. Building owners/operators live in a ***building-centric*** world; information must be stored in a ***building-based*** system.



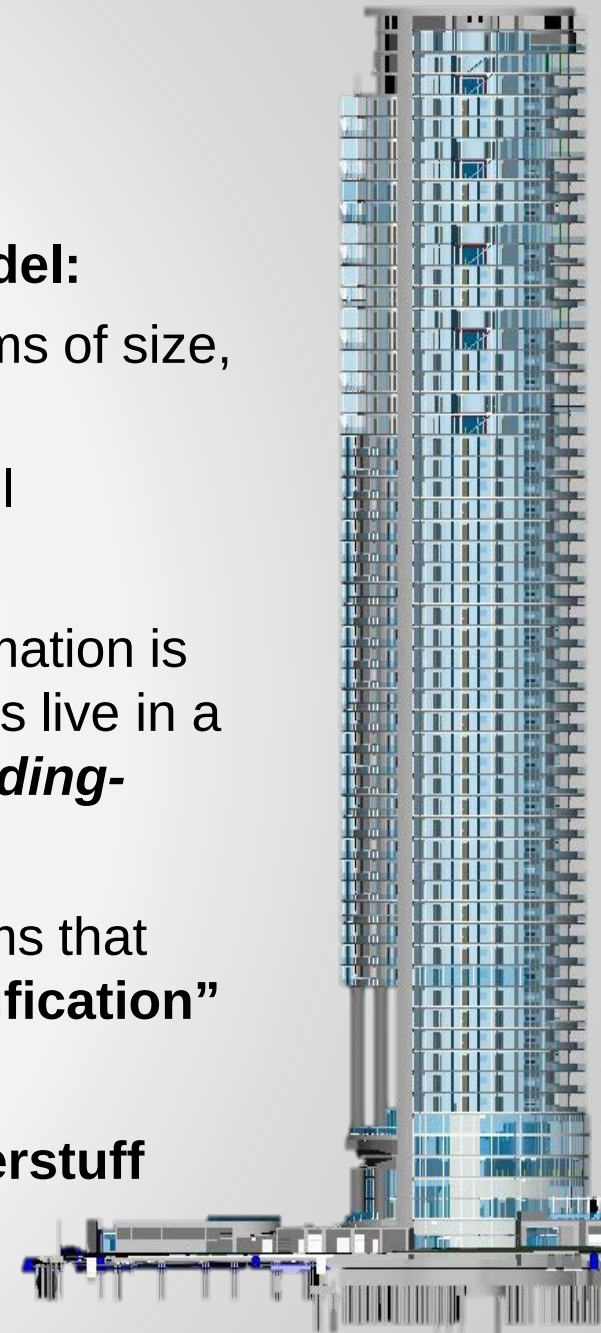
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4. Deliver only the information needed by the owner; **don’t overstuff the model.**



Thank you!



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