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

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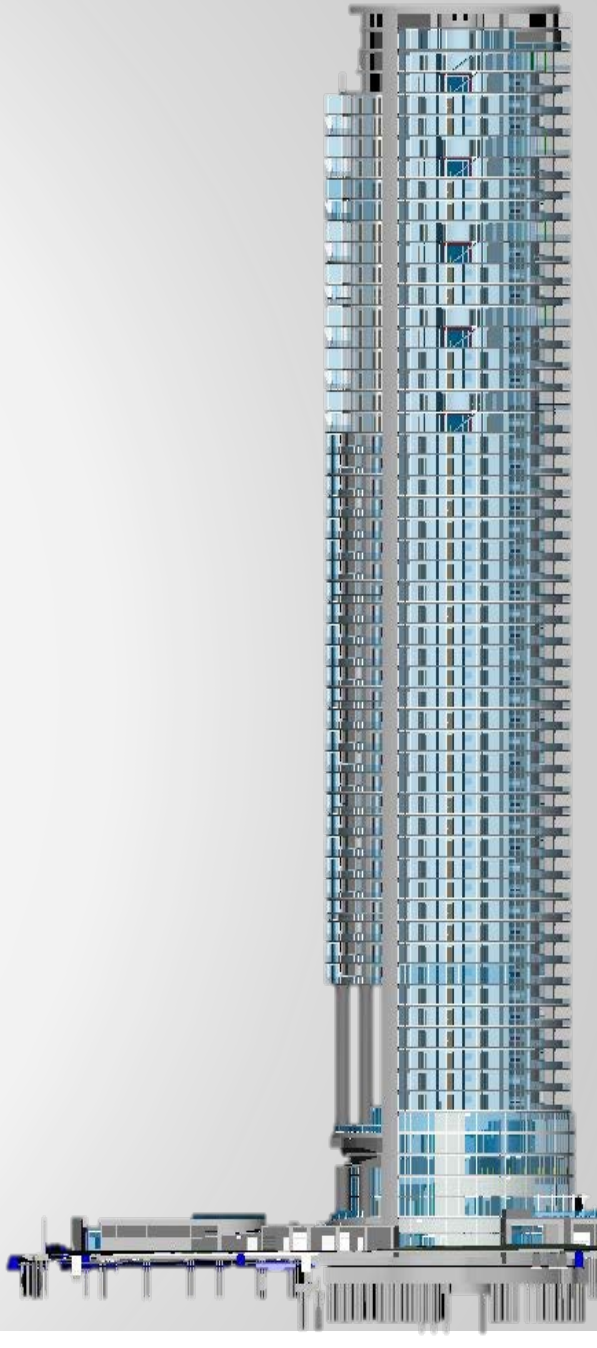
Program Outline, Learning Objectives, Speaker Profiles

Learning Objectives:

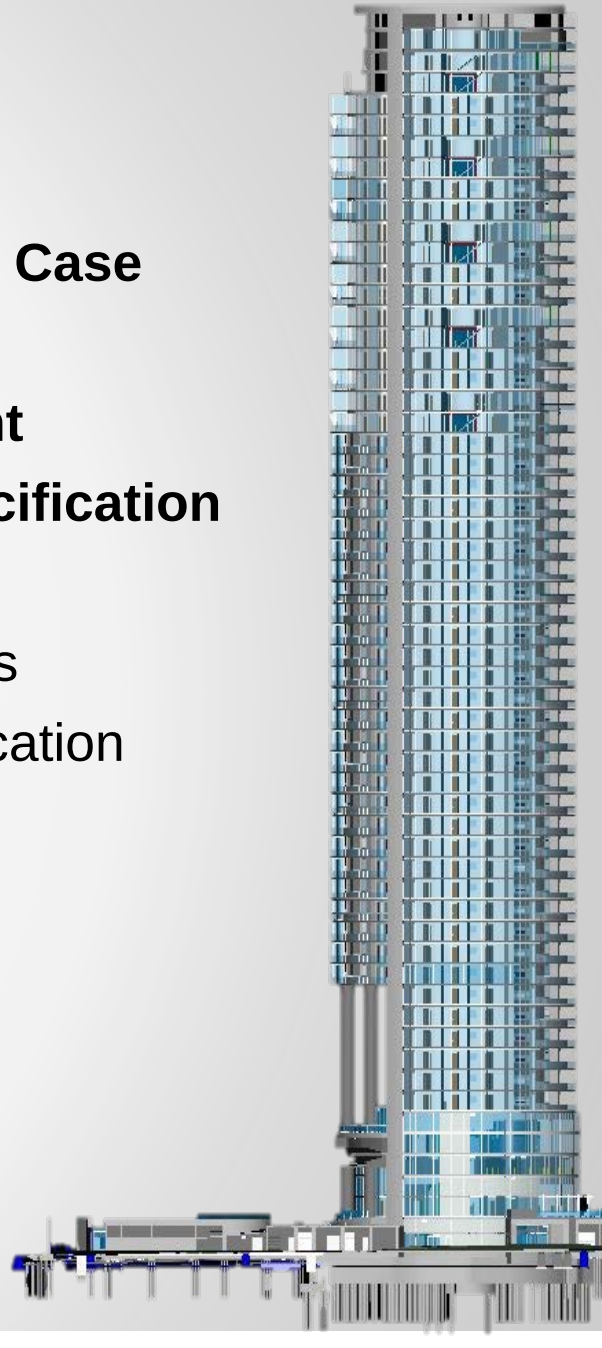
At the end of this session, participants will be able to:

- 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.

LinkedIn

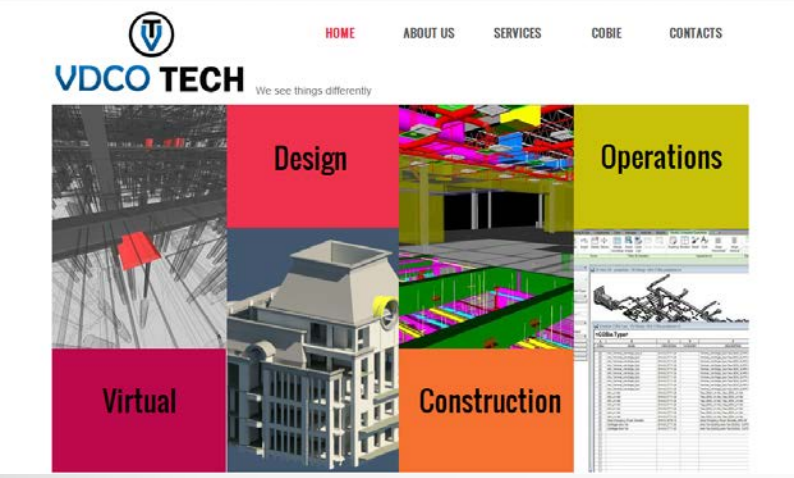
Birgitta Foster

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

VDCO TECH



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

AUTODESK.

Building Information 2014:

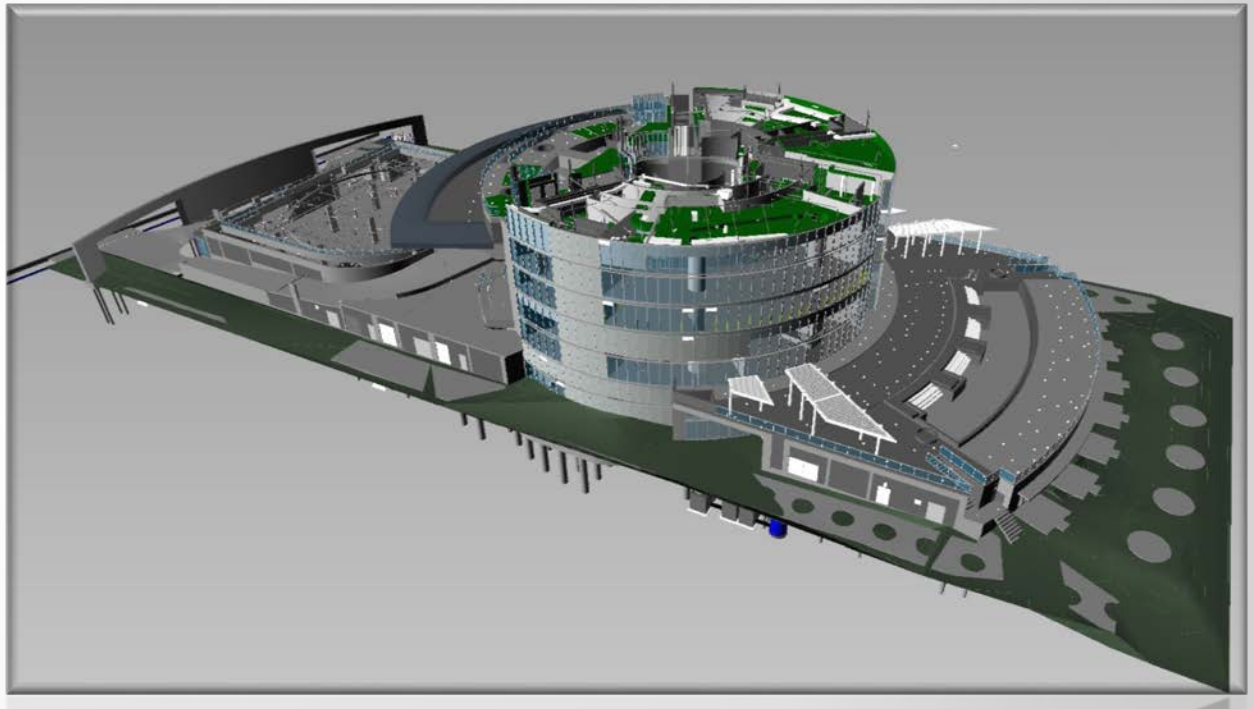
Let’s look at what we can do now…

- 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:

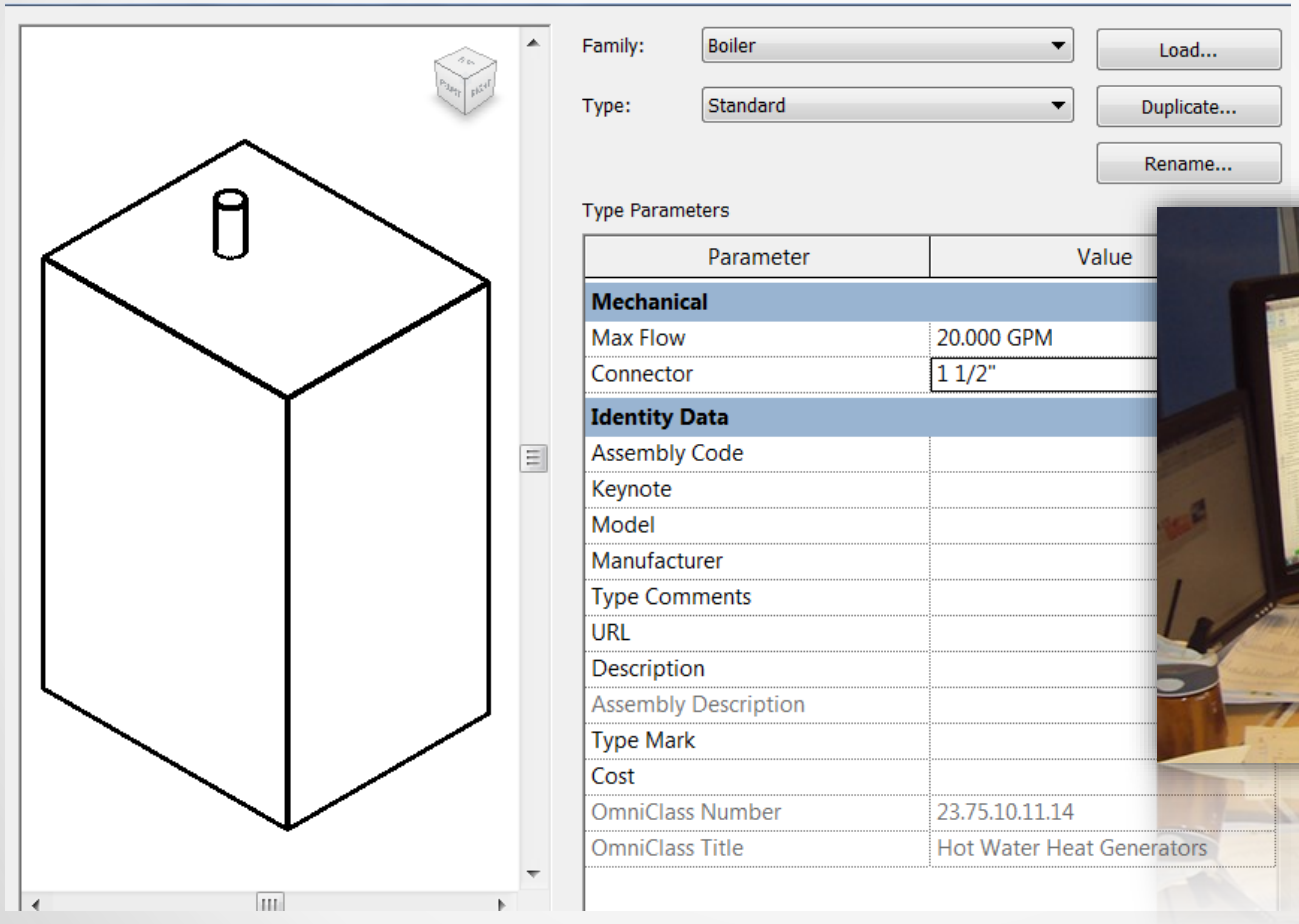
- Project Information
  - ✓ **Building Name**
  - ✓ **Site Address**
- Floor & Room Information
  - ✓ **Name / Number**
  - ✓ **Occupancy Type**
  - ✓ **Area (s.f.)**
  - ✓ **Finishes**
- Assets
  - ✓ **Type**
  - ✓ **Location**
  - ✓ **Instances**



Building Information 2014:

What information is **readily** available:

- **BIM Software Objects** - Generic



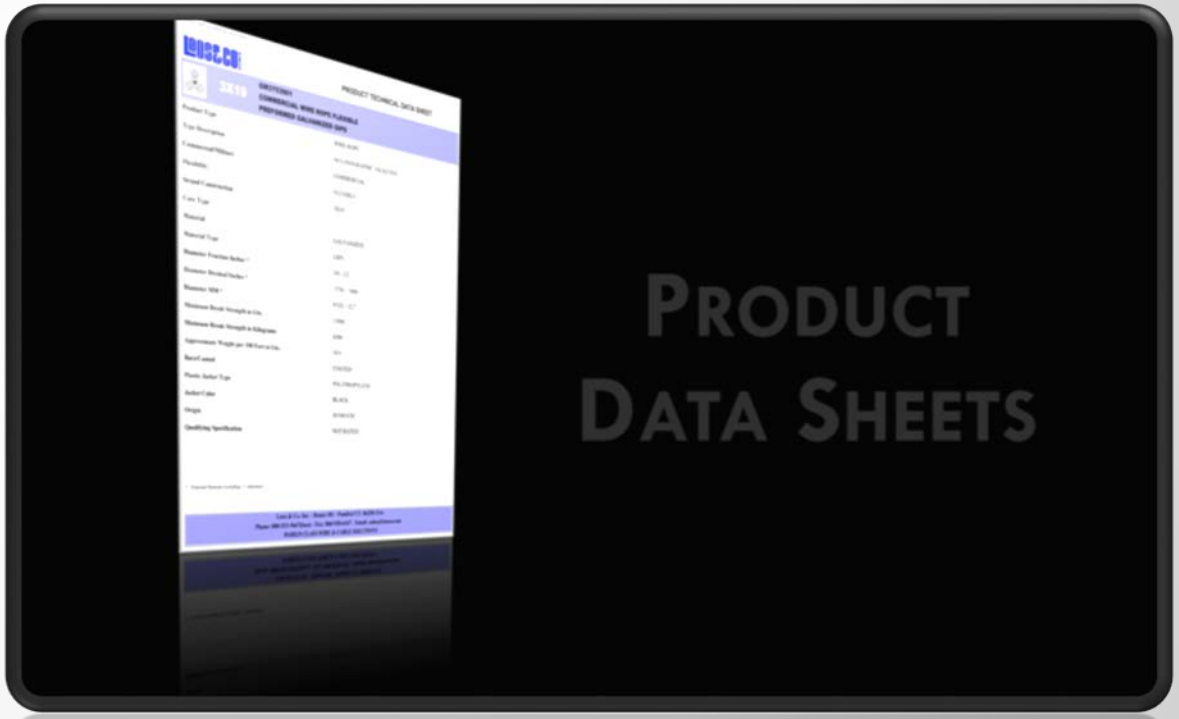
Building Information 2014:

What information is **readily** available:

Current Challenge:

Limited **Manufacturer-created** BIM objects

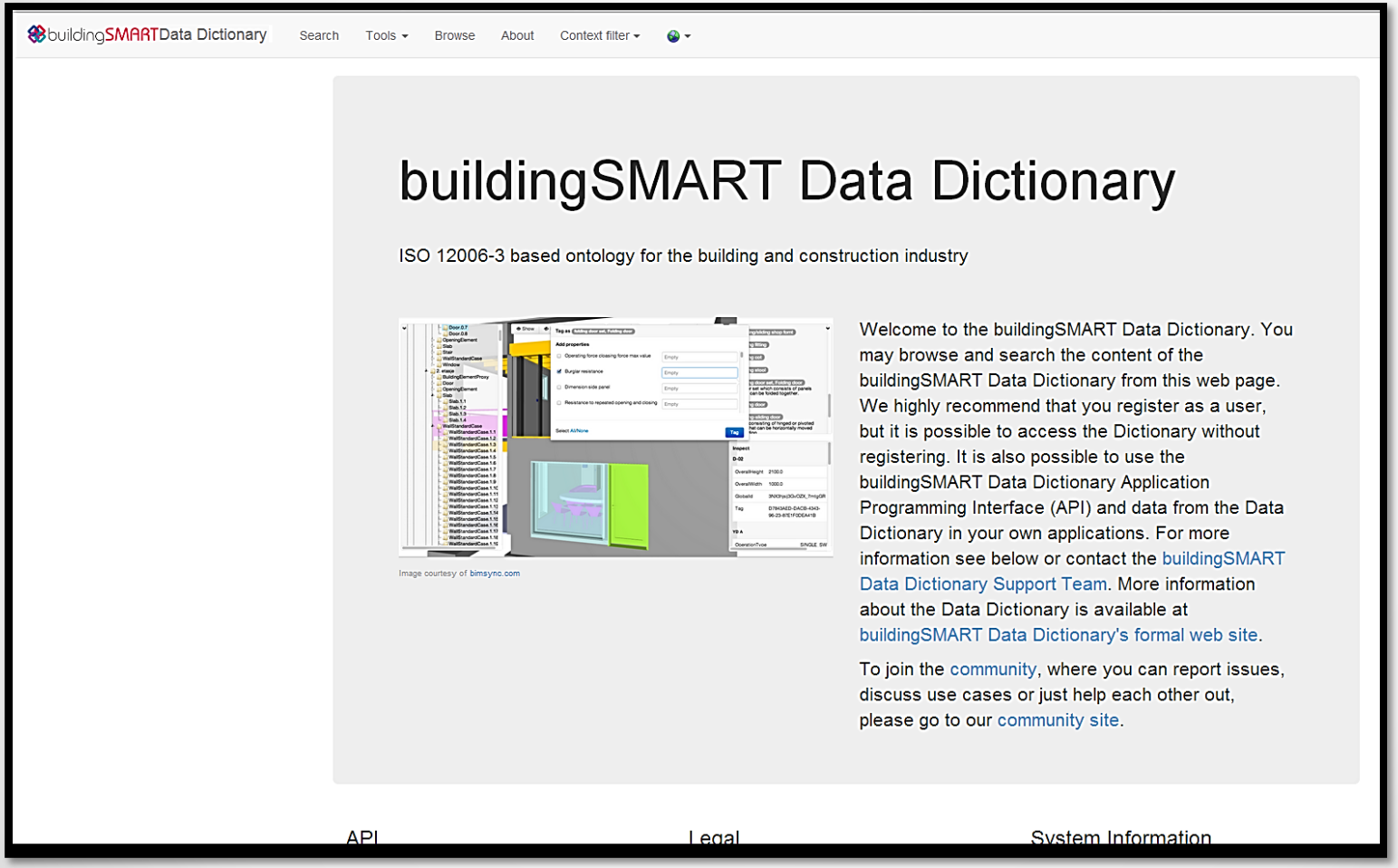
- Results in issues with:
  - ✓ **Multiple Product Libraries**
  - ✓ **Inconsistent Property Sets**
  - ✓ **Varying:**
    - Formats
    - Names



Overcoming Challenges: International Standards Development

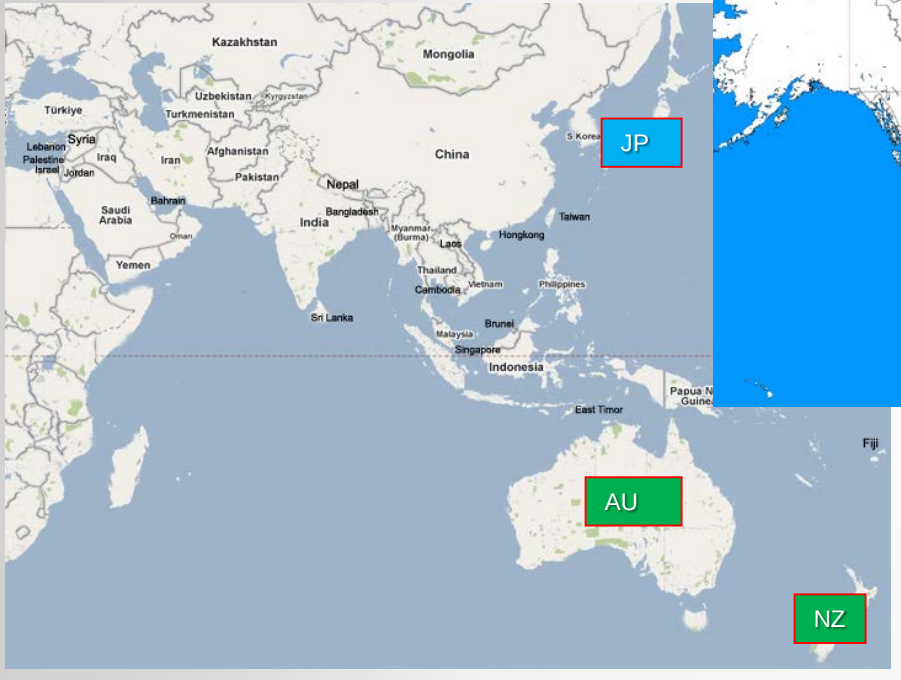
Building Information 2014:

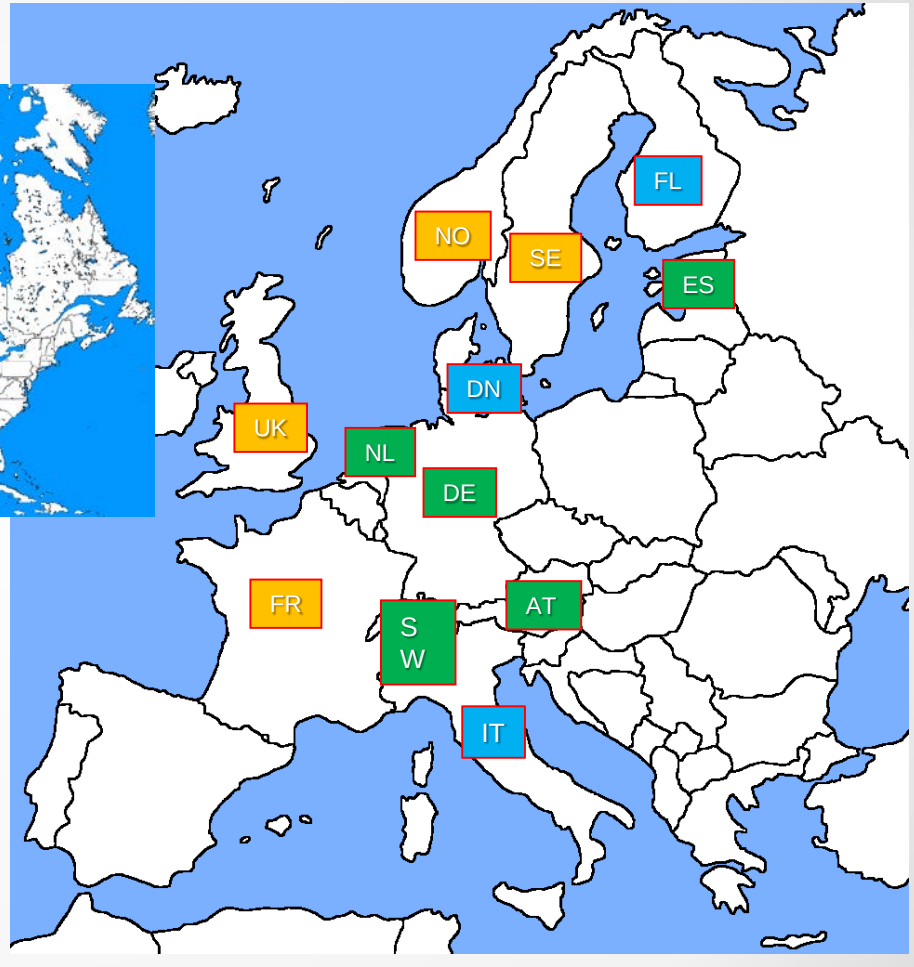
Solution: **International Data Dictionary**



http://bsdd.buildingsmart.org

Current Pilot Participants:
Seventeen (17) Countries

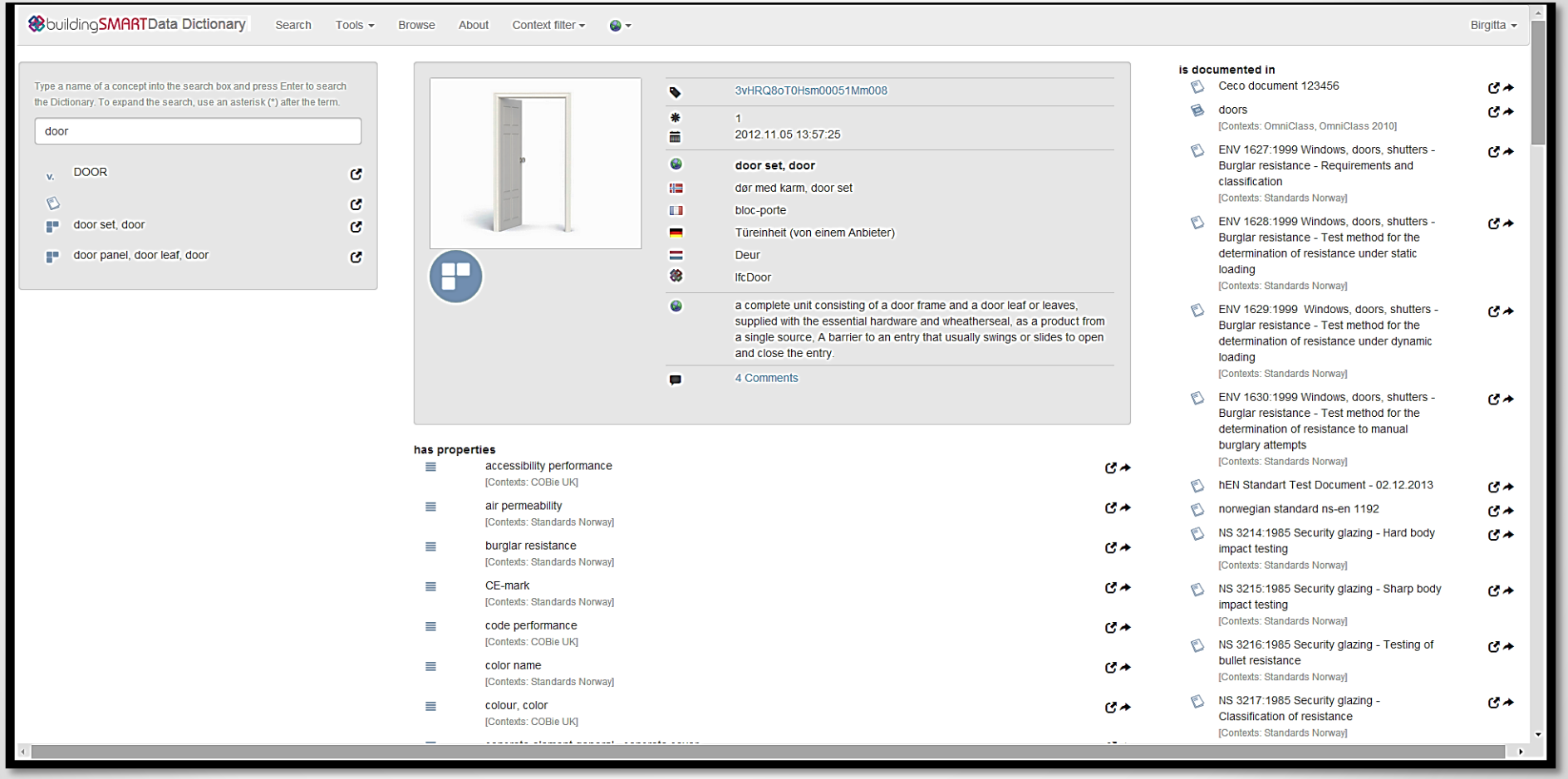




buildingSMART Data Dictionary

Building Information 2014:

Solution: **International Data Dictionary**



http://bsdd.buildingsmart.org

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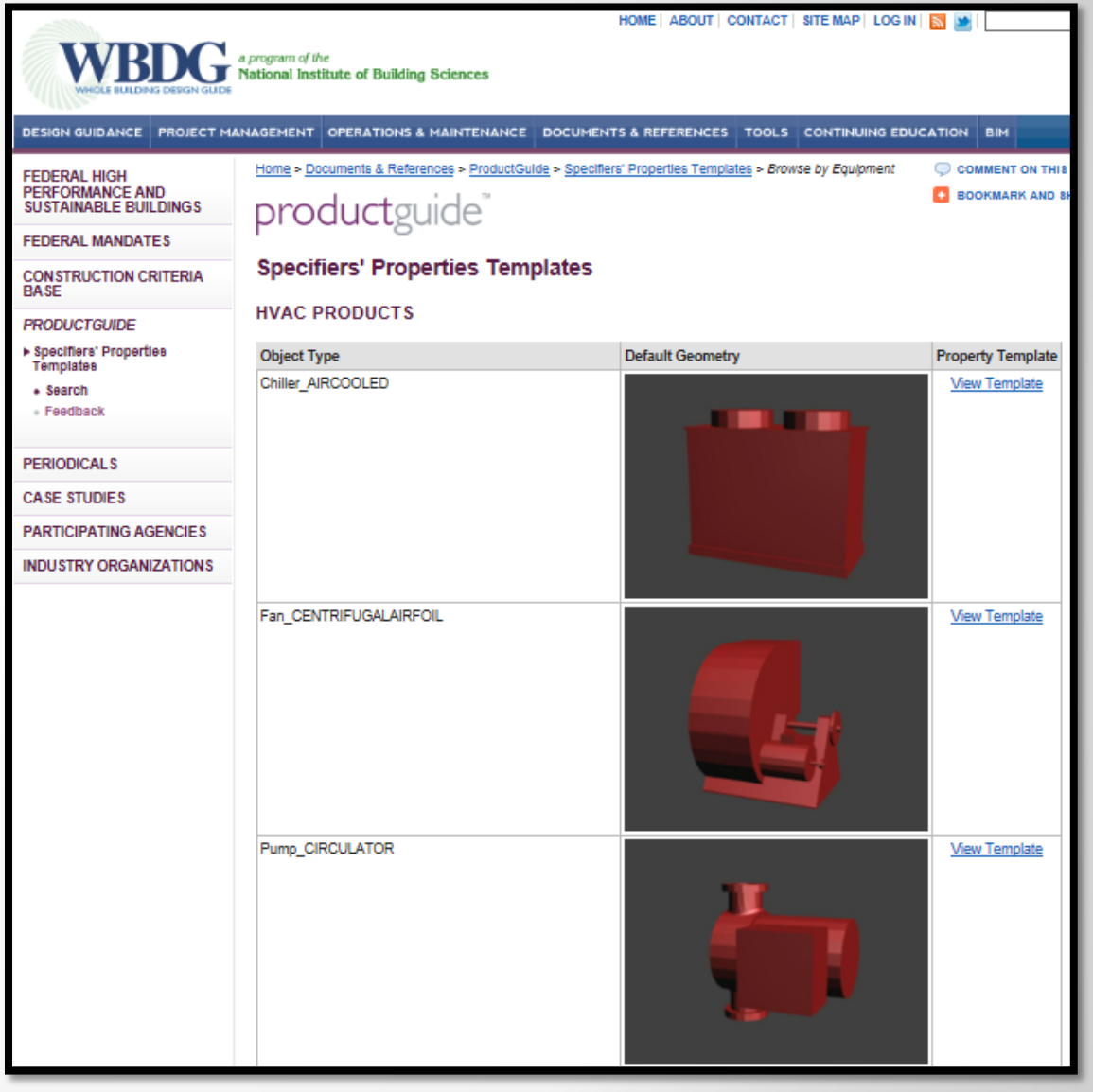
Building Information 2014:

Solution:

Standardize

Product Templates

http://www.wbdg.org/



Building Information 2014:

Solution:

Standardize

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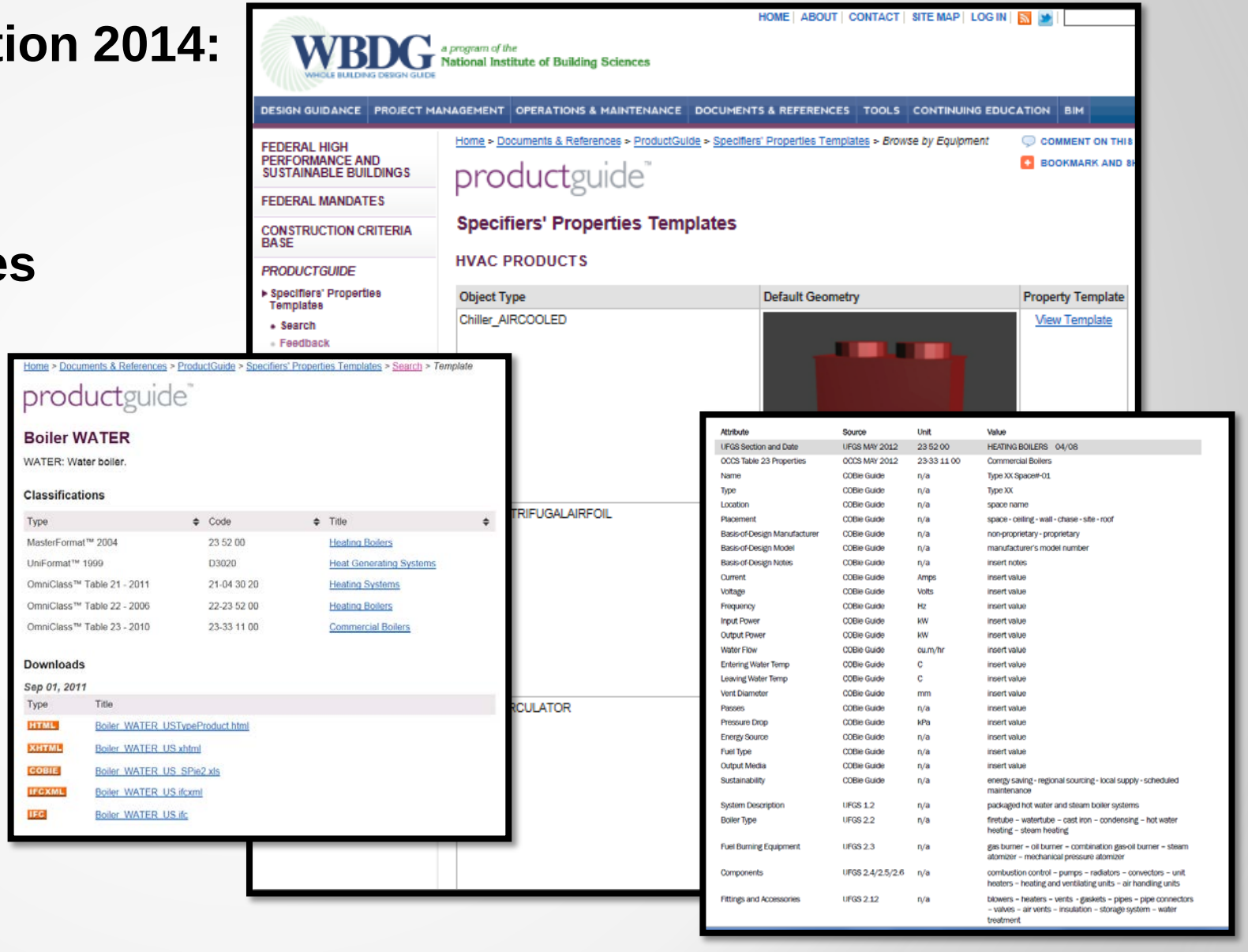
http://www.wbdg.org/



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)**

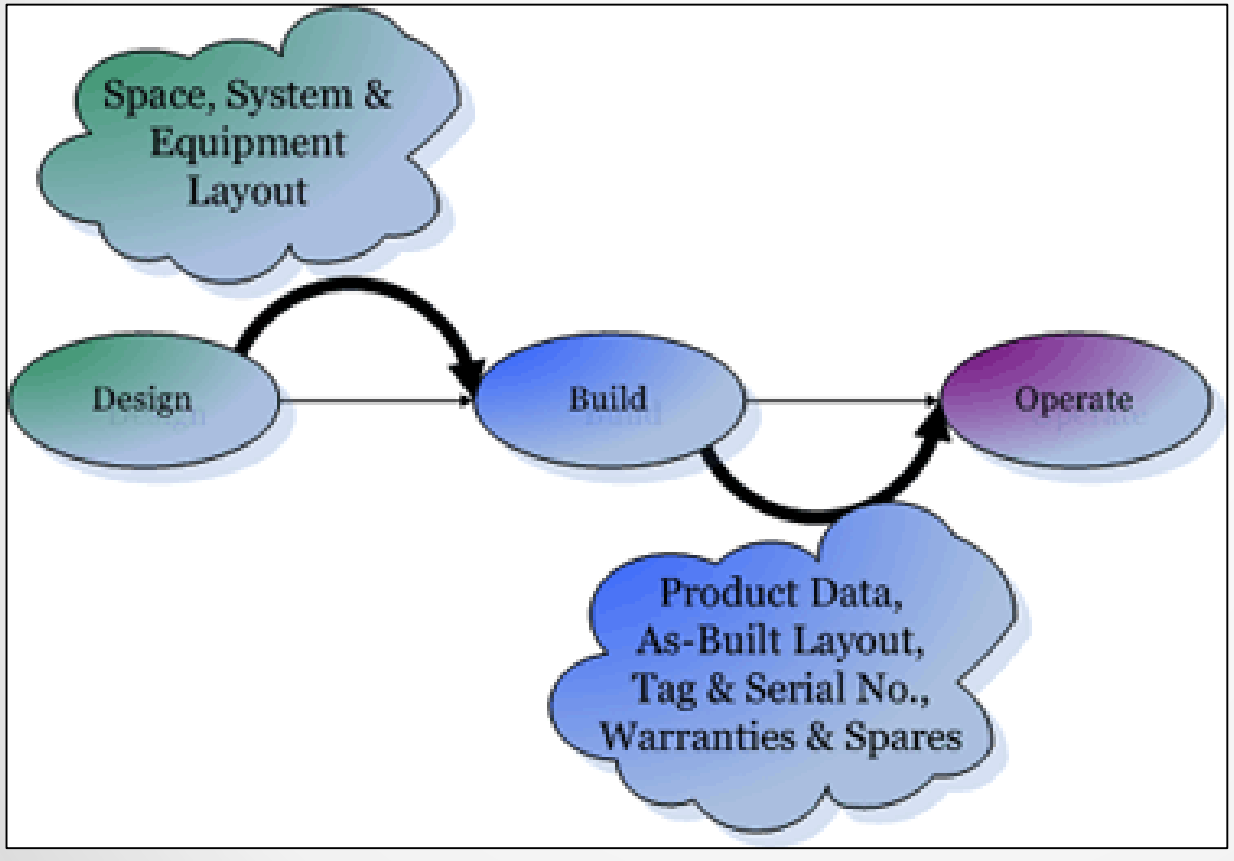
  compatible with the owner's CAFM, CMMS, or IWMS system.

The role of COBie in the BIM2FM Process

AUTODESK.

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

Instruction | Contact | Facility | Floor | Space | Type | **Component** | Zone | System ...

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.**

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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.**

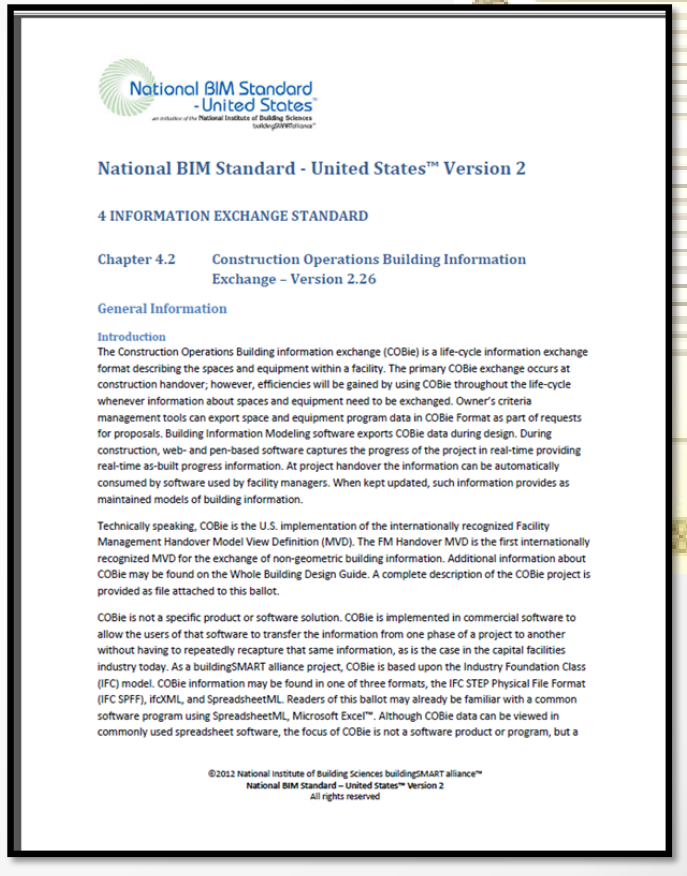
The Owner's Role:
Specifying Facility Information Requirements

Building Information 2014:

How to receive **only** the information needed:

- **Contract: Specify Required information**

- **Method: Use Open Information Exchange Standards**



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4 INFORMATION EXCHANGE STANDARD

Chapter 4.2 Construction Operations Building Information Exchange – Version 2.26

General Information

Introduction

The Construction Operations Building information exchange (COBie) is a life-cycle information exchange format describing the spaces and equipment within a facility. The primary COBie exchange occurs at construction handover; however, efficiencies will be gained by using COBie throughout the life-cycle whenever information about spaces and equipment need to be exchanged. Owner's criteria management tools can export space and equipment program data in COBie Format as part of requests for proposals. Building Information Modeling software exports COBie data during design. During construction, web- and pen-based software captures the progress of the project in real-time providing real-time as-built progress information. At project handover the information can be automatically consumed by software used by facility managers. When kept updated, such information provides as maintained models of building information.

Technically speaking, COBie is the U.S. implementation of the internationally recognized Facility Management Handover Model View Definition (MVD). The FM Handover MVD is the first internationally recognized MVD for the exchange of non-geometric building information. Additional information about COBie may be found on the Whole Building Design Guide. A complete description of the COBie project is provided as file attached to this ballot.

COBie is not a specific product or software solution. COBie is implemented in commercial software to allow the users of that software to transfer the information from one phase of a project to another without having to repeatedly recapture that same information, as is the case in the capital facilities industry today. As a buildingSMART alliance project, COBie is based upon the Industry Foundation Class (IFC) model. COBie information may be found in one of three formats, the IFC STEP Physical File Format (IFC SPFF), ifcXML, and SpreadsheetML. Readers of this ballot may already be familiar with a common software program using SpreadsheetML, Microsoft Excel™. Although COBie data can be viewed in commonly used spreadsheet software, the focus of COBie is not a software product or program, but a

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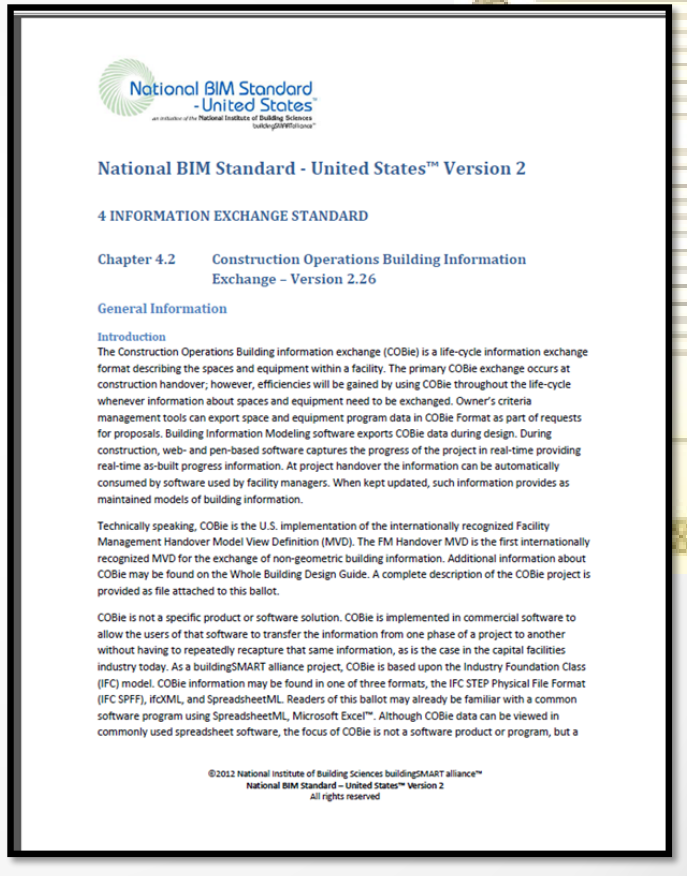
Building Information 2014:

How to receive **only** the information needed:

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



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How to receive **only** the information needed

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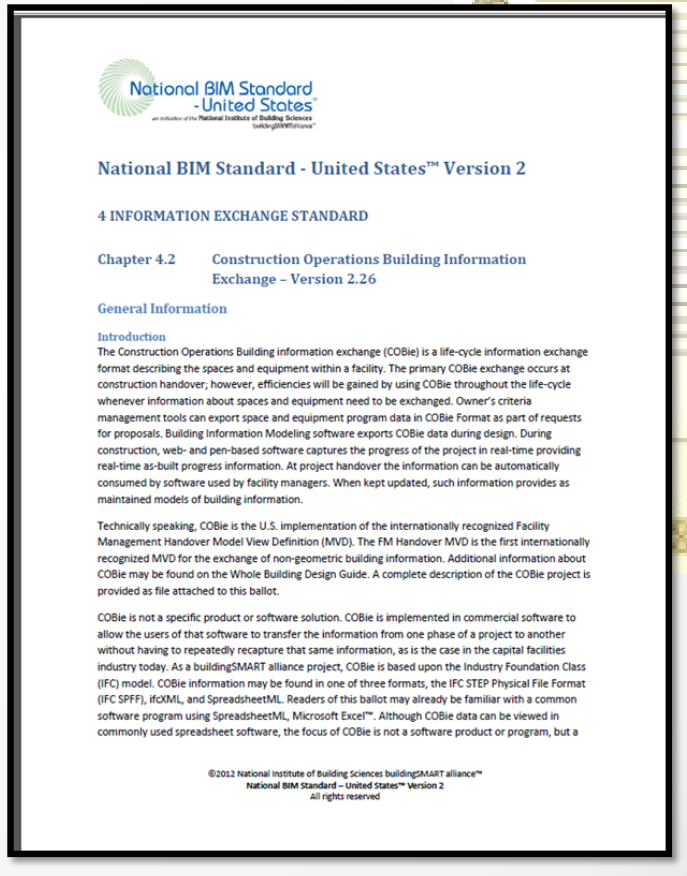
  - ✓ **Format**
  - ✓ **Naming Conventions**
- **Method: Use Open Information Exchange Standards**
  - ✓ **Construction Operations Building Information Exchange (COBie)**



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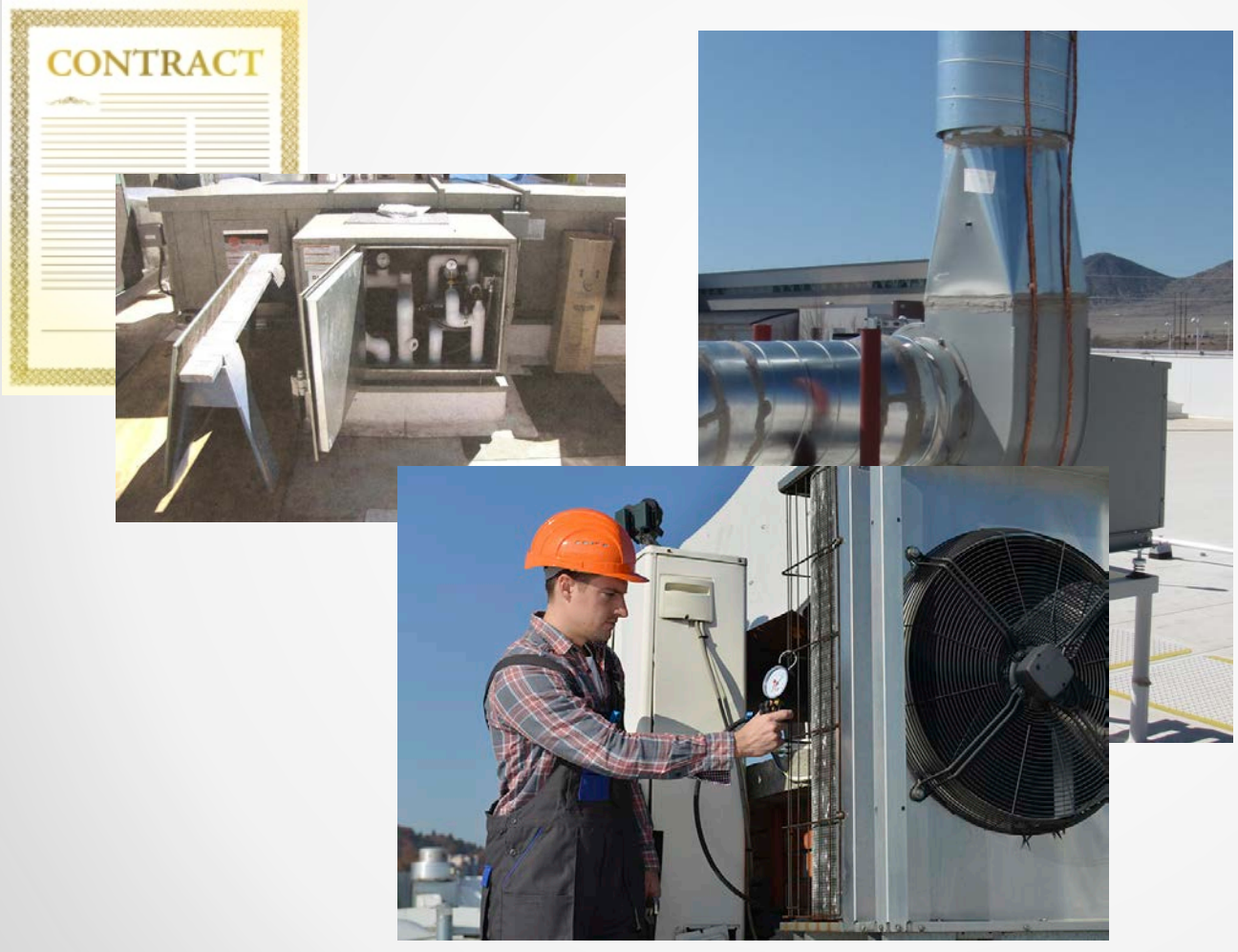
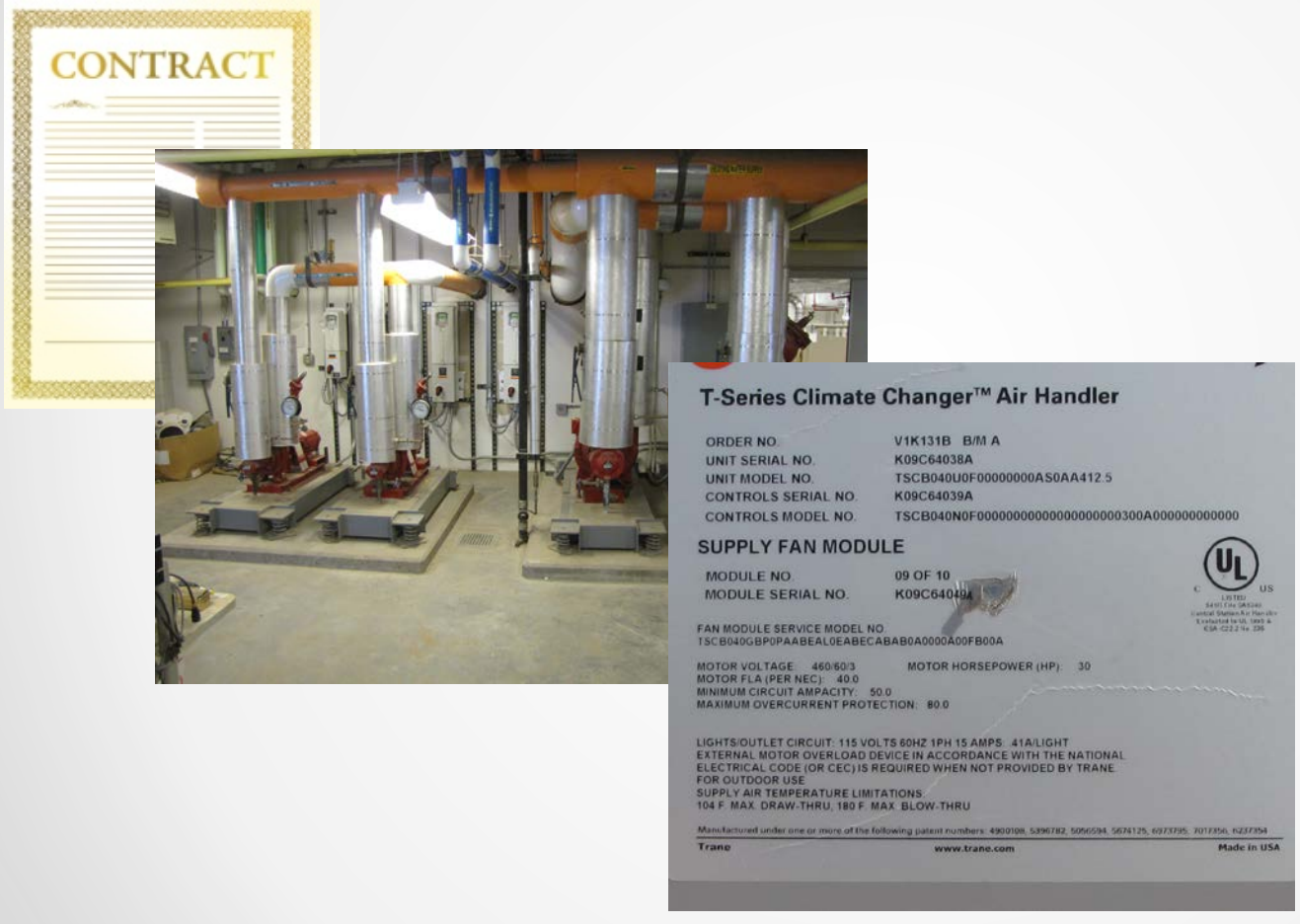
Building Information 2014:
Contract: Specify Asset List



*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



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	

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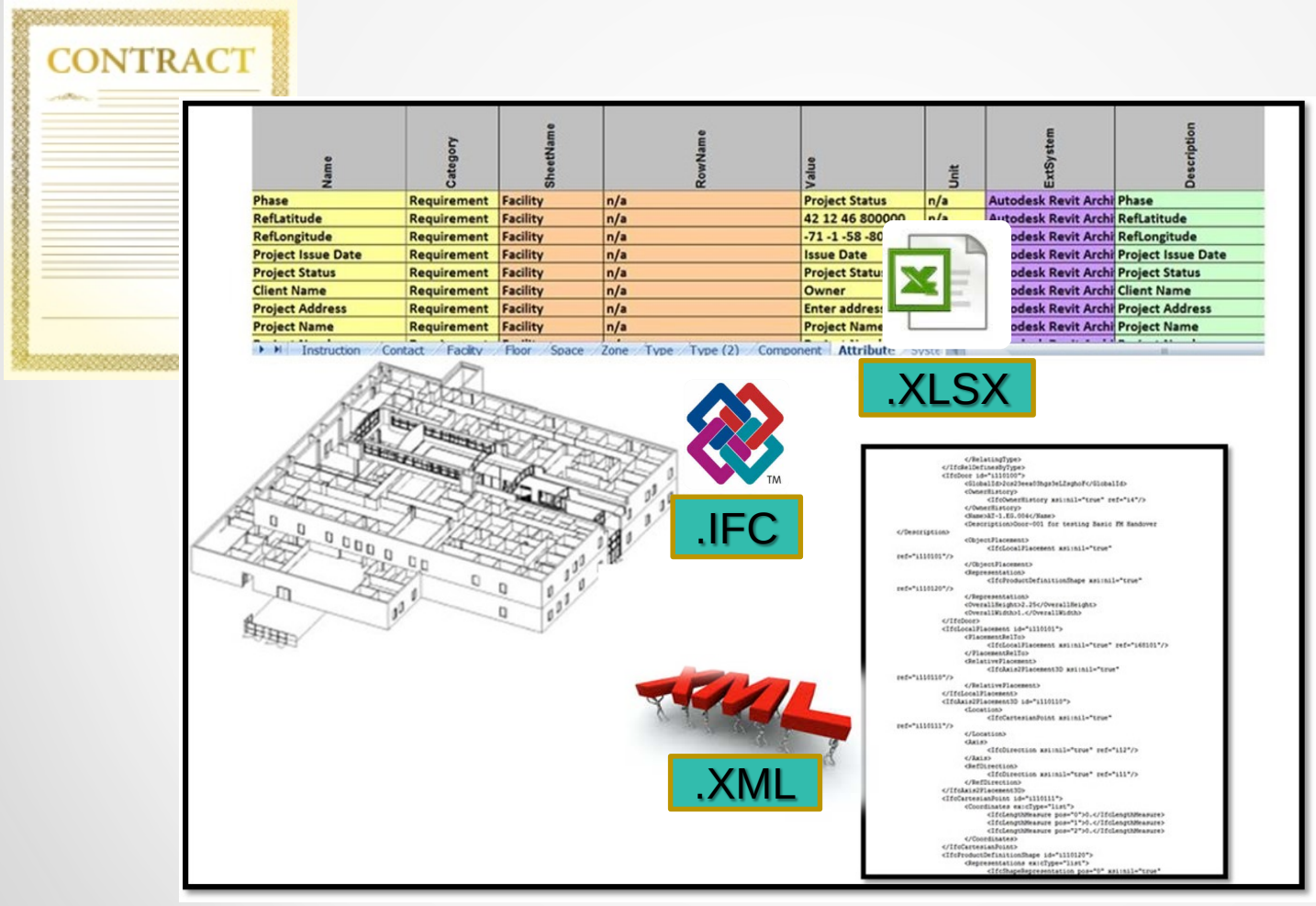
Building Information 2014:

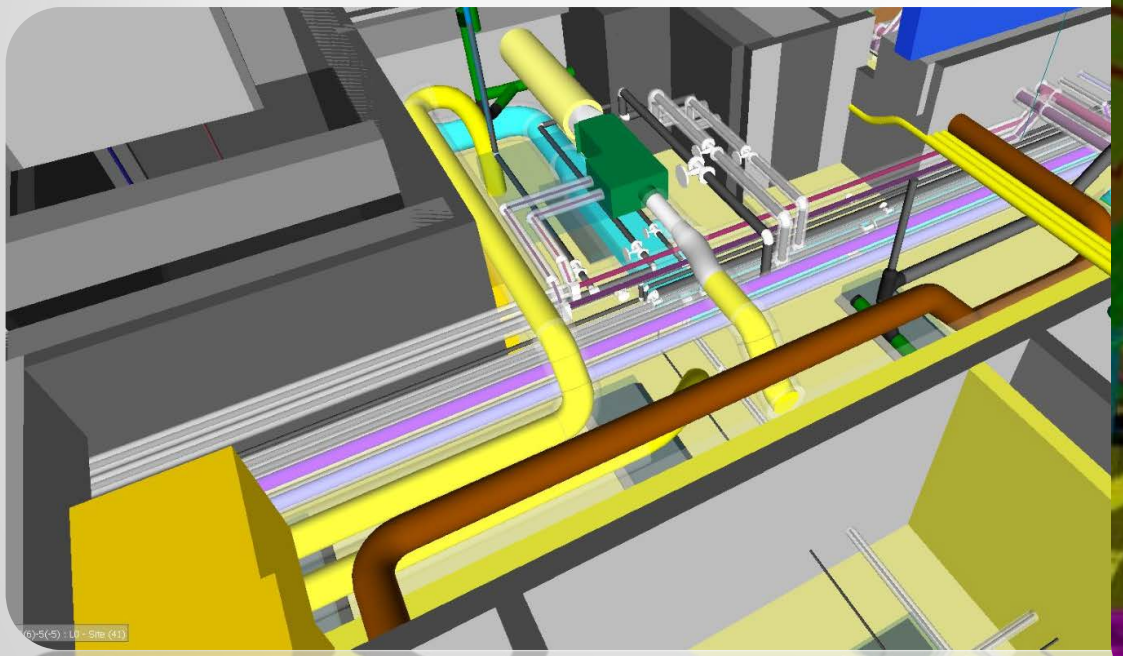
Contract: Specify Required COBie Data Formats

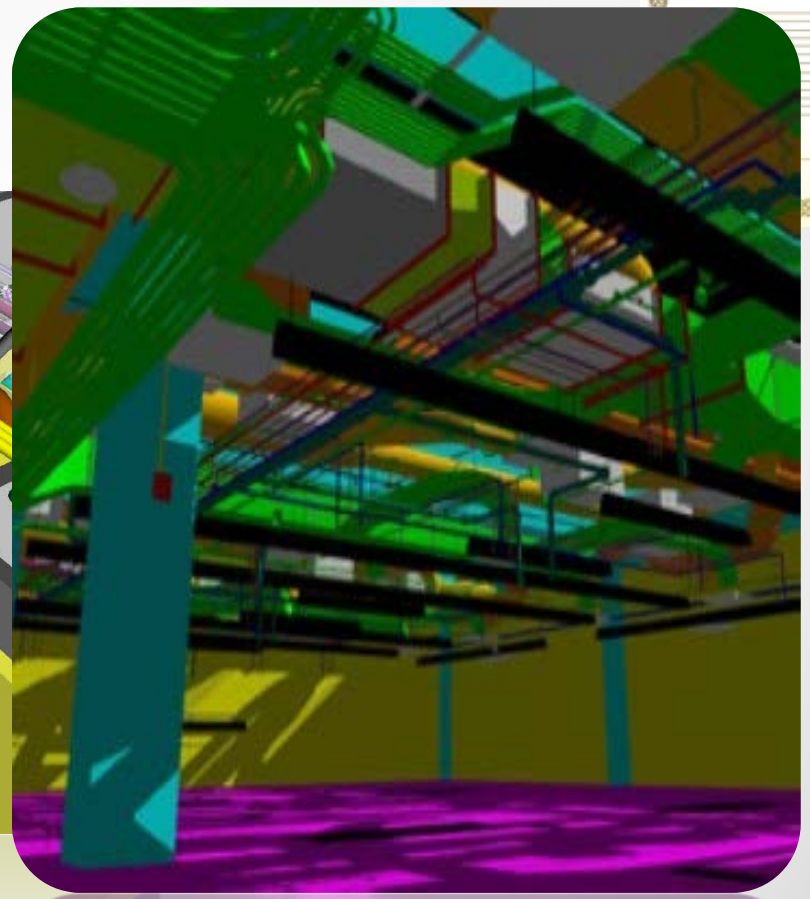


Building Information 2014:

Contract: Specify Unique Naming Conventions

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

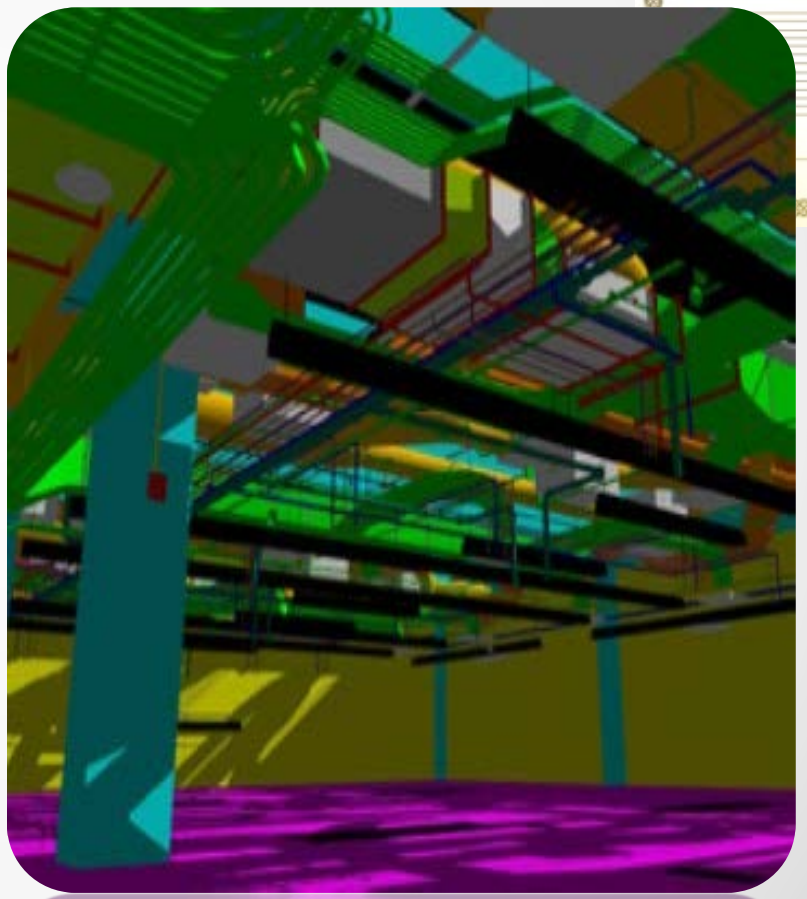




Building Information 2014:

Contract: Specify Unique Naming Conventions

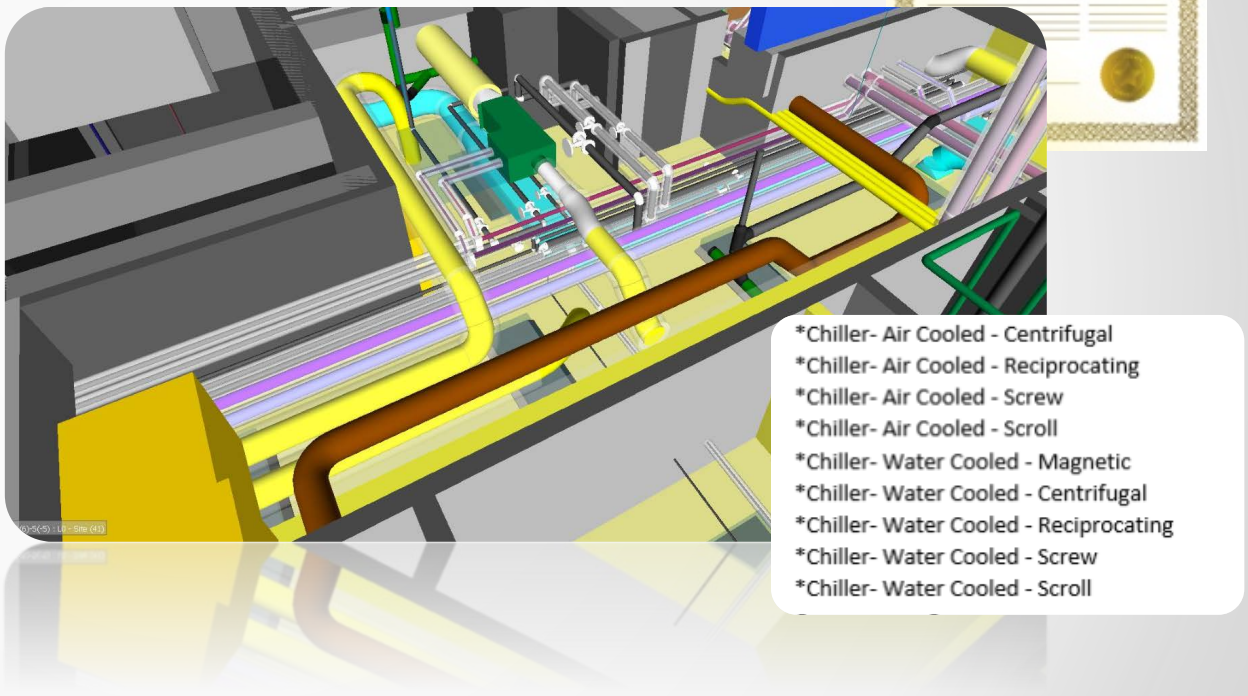
- Space Planning (Architecture)
  - ✓ **Site**
    - Campus Names
    - Site Location
  - ✓ **Building**
    - Building Name
    - Building Number
  - ✓ **Room**
    - Room Names
    - Room Numbers
  - ✓ **Classification Systems**
    - Building Types
    - Room Types



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



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%

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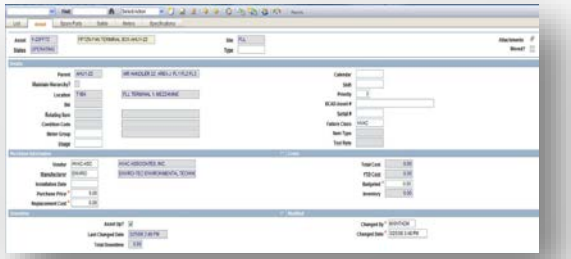
FACILITIES INFORMATION in contract

Required Data set
Asset Name
Asset Type Name
Location
Description

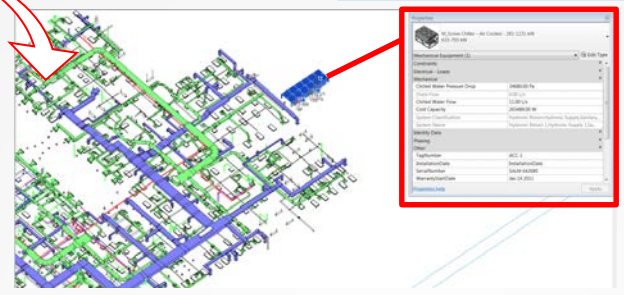
FACILITIES INFORMATION in Asset Management Program



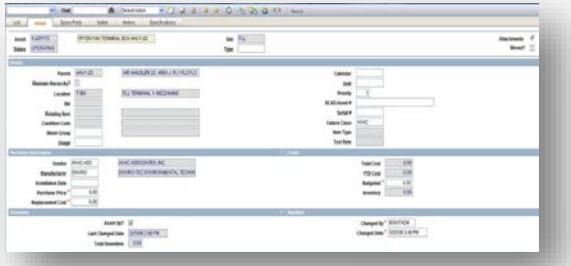
FACILITIES INFORMATION in contract

Required Data set
Asset Name
Asset Type Name
Location
Description

FACILITIES INFORMATION entered in Model



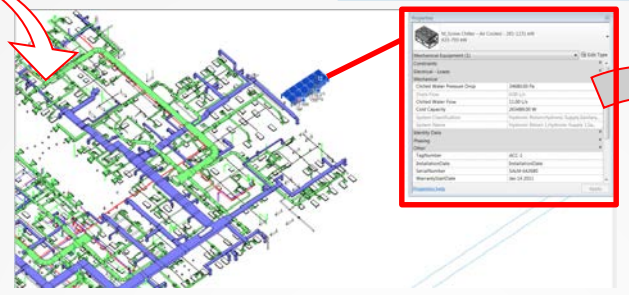
FACILITIES INFORMATION in Asset Management Program



FACILITIES INFORMATION in contract

Required Data set
Asset Name
Asset Type Name
Location
Description

FACILITIES INFORMATION entered in Model



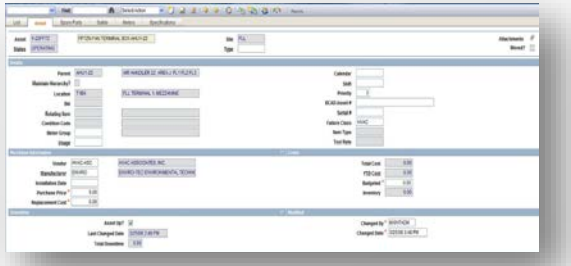
FACILITIES INFORMATION in COBie format

Deliverable

Name	Type	Space	Description	FSystem	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	CPM890	2011-02-20T10:30:25	2011-02-20T10:30:25

Instruction | Contact | Facility | Floor | Space | Type | Component | Zone | System

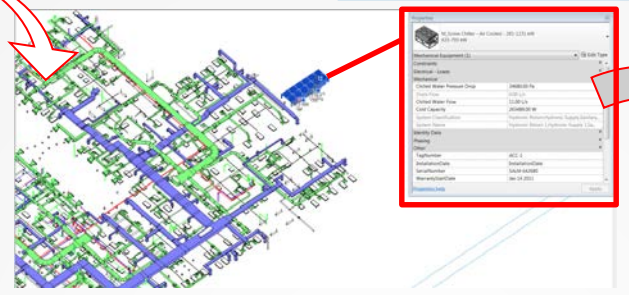
FACILITIES INFORMATION in Asset Management Program



FACILITIES INFORMATION in contract

Required Data set
Asset Name
Asset Type Name
Location
Description

FACILITIES INFORMATION entered in Model

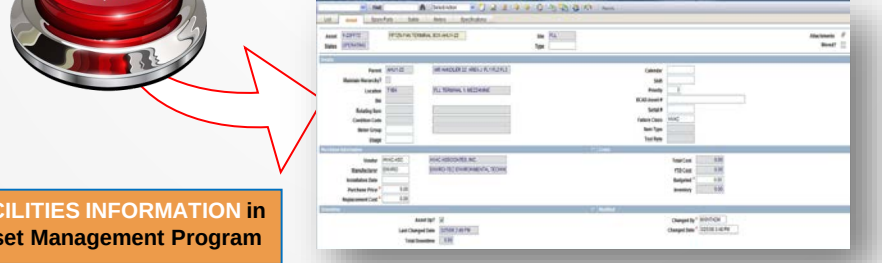


Deliverable

FACILITIES INFORMATION in COBie format

Name	Type	Space	Description	IfSystem	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	CJPM890	2011-02-20T10:30:25	2011-02-20T10:30:25

Instruction | Contact | Facility | Floor | Space | Type | Component | Zone | System



FACILITIES INFORMATION in Asset Management Program

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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-US™***

Construction-to-Operations Building information exchange

BLCI

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

Facility
[Facility] Name
[Facility] Category
ProjectName
SiteName
LinearUnit
AreaUnits
VolumeUnits
CurrencyUnit
AreaMeasurement
[Facility] Description
ProjectDescription
SiteDescription
[Facility] Phase

Floor
[Floor] Name
[Floor] Category
[Floor] Description
[Floor] Elevation
[Floor] Height

Space
[Space] Name
[Space] Category
FloorName
[Space] Description
RoomTag
UsableHeight
GrossArea
NetArea

Zone
[Zone] Name
[Zone] Category
SpaceNames
[Zone]Description

ALL DATA TABLES
CreatedBy
CreatedOn

Asset (Equipment) Information

[Asset] Type
[Type] Name
[Type] Category
[Type] Description
AssetType
Manufacturer
ModelNumber
WarrantyGuarantorParts
Warranty DurationParts
WarrantyGuarantorLabor
WarrantyDurationLabor
WarrantyDurationUnit
ReplacementCost
ExpectedLife
DurationUnit
WarrantyDescription
NominalLength
NominalWidth
NominalHeight
ModelReference
Shape
Size
Color
Finish
Grade
Material
Constituents
Features
AccessibilityPerformance
CodePerformance
SustainabilityPerformnce

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

O & M Information

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

Reference Information

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

Coordinate
[Coordinate] Name
[Coordinate] Category
SheetName
RowName
CoordinateXAxis
CoordinateYAxis
CoordinateZAxis
ClockwiseRotation
ElevationalRotation
YawRotation

Issue
[Issue] Name
[Issue] Type
Risk
Chance
Impact
SheetName1
RowName1
SheetName2
RowName2
[Issue] Description
[Issue] Owner
Mitigation

- 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.

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

Spatial Information

Facility	
x	[Facility] Name
x	[Facility] Category
x	ProjectName
x	SiteName
x	LinearUnit
x	AreaUnits
x	VolumeUnits
x	CurrencyUnit
x	AreaMeasurement
	[Facility] Description
	ProjectDescription
	SiteDescription
	[Facility] Phase

Floor	
x	[Floor] Name
x	[Floor] Category
	[Floor] Description
	[Floor] Elevation
	[Floor] Height

Space	
x	[Space] Name
x	[Space] Category
x	FloorName
x	[Space] Description
	RoomTag
	UsableHeight
	GrossArea
	NetArea

Zone	
x	[Zone] Name
x	[Zone] Category
x	SpaceNames
x	[Zone]Description

ALL DATA TABLES	
x	CreatedBy
x	CreatedOn

Asset (Equipment) Information

[Asset] Type	
x	[Type] Name
x	[Type] Category
x	[Type] Description
x	AssetType
x	Manufacturer
x	ModelNumber
x	WarrantyGuarantorParts
x	Warranty DurationParts
x	WarrantyGuarantorLabor
x	WarrantyDurationLabor
x	WarrantyDurationUnit
	ReplacementCost
	ExpectedLife
	DurationUnit
	WarrantyDescription
	NominalLength
	NominalWidth
	NominalHeight
	ModelReference
	Shape
	Size
	Color
	Finish
	Grade
	Material
	Constituents
	Features
	AccessibilityPerformance
	CodePerformance
	SustainabilityPerformnce

Component	
x	[Component] Name
x	TypeName
x	Space
x	[Component] Description
x	SerialNumber
x	InstallationDate
x	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

O & M Information

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

Reference Information

Contact	
x	[Contact] Email [Address]
x	[Contact] Category
x	Company
x	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

Coordinate	
	[Coordinate] Name
	[Coordinate] Category
	SheetName
	RowName
	CoordinateXAxis
	CoordinateYAxis
	CoordinateZAxis
	ClockwiseRotation
	ElevationalRotation
	YawRotation

Issue	
	[Issue] Name
	[Issue] Type
	Risk
	Chance
	Impact
	SheetName1
	RowName1
	SheetName2
	RowName2
	[Issue] Description
	[Issue] Owner
	Mitigation

- From the complete list of COBie data fields, we work closely with the owner to identify **ONLY** the building information needed by the owner.

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Sample Facility Information Scope - Extended

Spatial Information	Asset (Equipment) Information	O & M Information	Reference Information

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

[Asset] Type

x	[Type] Name
x	[Type] Category
x	[Type] Description
x	AssetType
x	Manufacturer
x	ModelNumber
x	WarrantyGuarantorParts
x	Warranty DurationParts
x	WarrantyGuarantorLabor
x	WarrantyDurationLabor
x	WarrantyDurationUnit
x	OwnerDefined
x	OwnerDefined

Component

x	[Component] Name
x	TypeName
x	Space
x	[Component] Description
x	SerialNumber
x	InstallationDate
x	WarrantyStartDate
x	OwnerDefined
x	OwnerDefined
x	OwnerDefined
x	OwnerDefined

Contact

x	[Contact] Email [Address]
x	[Contact] Category
x	Company
x	Phone [Number]

Floor

x	[Floor] Name
x	[Floor] Category
x	OwnerDefined
x	OwnerDefined

Space

x	[Space] Name
x	[Space] Category
x	FloorName
x	[Space] Description
x	OwnerDefined
x	OwnerDefined
x	OwnerDefined

Zone

x	[Zone] Name
x	[Zone] Category
x	SpaceNames
x	[Zone]Description

ALL DATA TABLES

x	CreatedBy
x	CreatedOn

COBie is fully extensible and adaptable:

- ✓ Optional **proprietary data fields** can be added to the standard COBie data fields to meet an Owner's specific information needs.
- ✓ Required COBie data fields **unneeded by the owner** may have a value of "n/a."

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Sample Facility Information Scope - Extended

Spatial Information

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

Floor	
x	[Floor] Name
x	[Floor] Category
x	OwnerDefined
x	OwnerDefined

Space	
x	[Space] Name
x	[Space] Category
x	FloorName
x	[Space] Description
x	OwnerDefined
x	OwnerDefined
x	OwnerDefined

Zone	
x	[Zone] Name
x	[Zone] Category
x	SpaceNames
x	[Zone]Description

ALL DATA TABLES	
x	CreatedBy
x	CreatedOn

Asset (Equipment) Information

[Asset] Type	
x	[Type] Name
x	[Type] Category
x	[Type] Description
x	AssetType
x	Manufacturer
x	ModelNumber
x	WarrantyGuarantorParts
x	Warranty DurationParts
x	WarrantyGuarantorLabor
x	WarrantyDurationLabor
x	WarrantyDurationUnit
x	OwnerDefined
x	OwnerDefined

Component	
x	[Component] Name
x	TypeName
x	Space
x	[Component] Description
x	SerialNumber
x	InstallationDate
x	WarrantyStartDate
x	OwnerDefined
x	OwnerDefined
x	OwnerDefined
x	OwnerDefined

O & M Information

Reference Information

Contact	
x	[Contact] Email [Address]
x	[Contact] Category
x	Company
x	Phone [Number]

- ✓ The final scope conforms both to COBie **and** to the Owner's proprietary information requirements.
- ✓ Only information **required by the Owner** is extracted from models.
- ✓ The scope is **clear to all parties,** mitigating risk, minimizing cost, and eliminating potential misunderstandings.
- ✓ The deliverable is **facility information;** not an "as-built record model."

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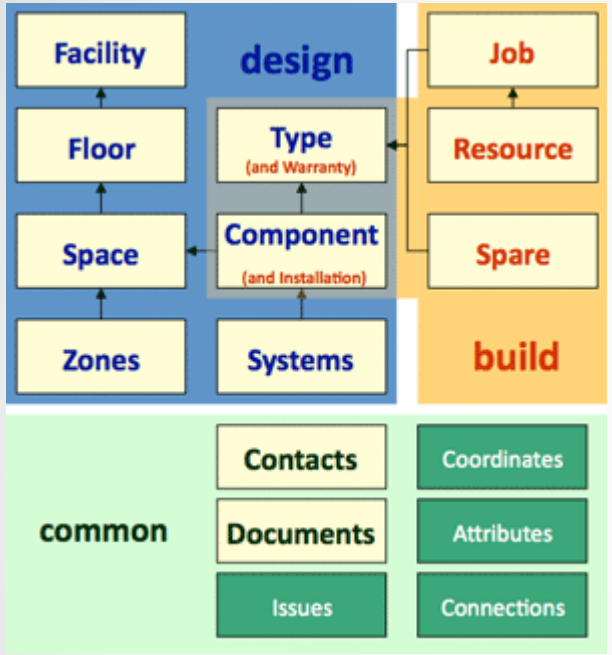
Naming Conventions:

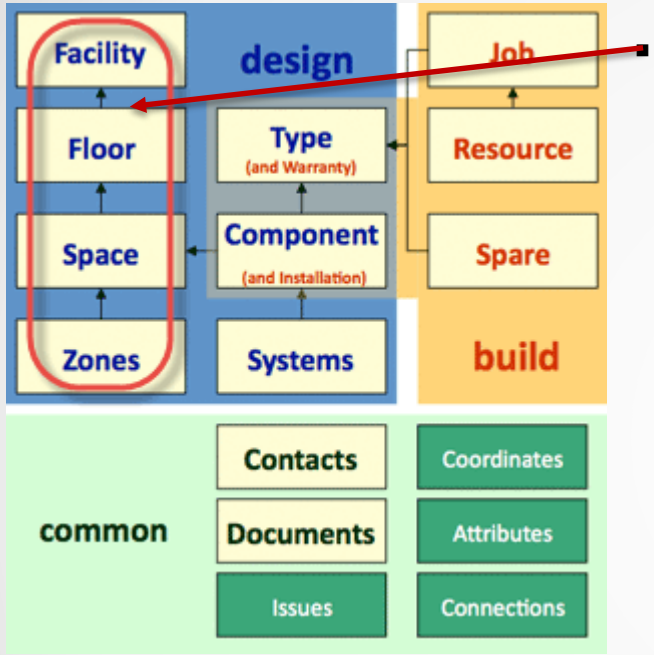
- Together with the Owner's **facility management team,** develop a **naming convention** for each building component or piece of equipment.
- Our recommended **naming convention** "concatenates" the facility, floor, and asset type names to create a unique name for each physical asset:
  - **120Bdwy-Penthouse-AHU1**
  - **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?



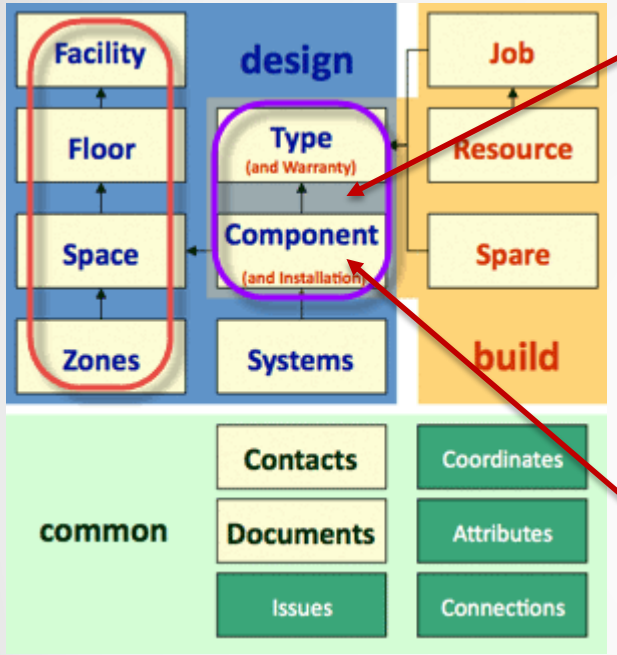
- The **Facility Information Specification** defines which party is responsible for delivering which pieces of information, and on what schedule.
- Facility information delivery is timed to coincide with **traditional contract deliverables.**
- **Responsibility** for facility information **is aligned**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

Progressive Data Delivery



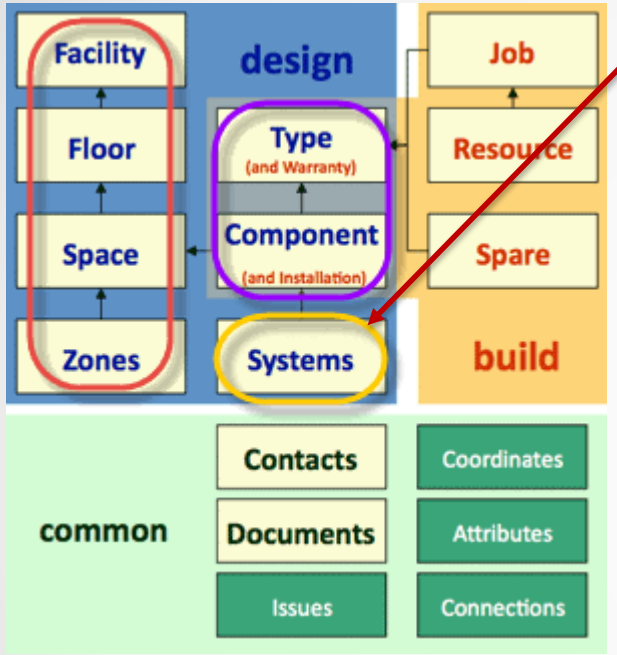
When the architectural design and the size and arrangement of spaces are finalized and approved, the architect submits the **facility spatial information** as an integral part of the contract documents.

Progressive Data Delivery



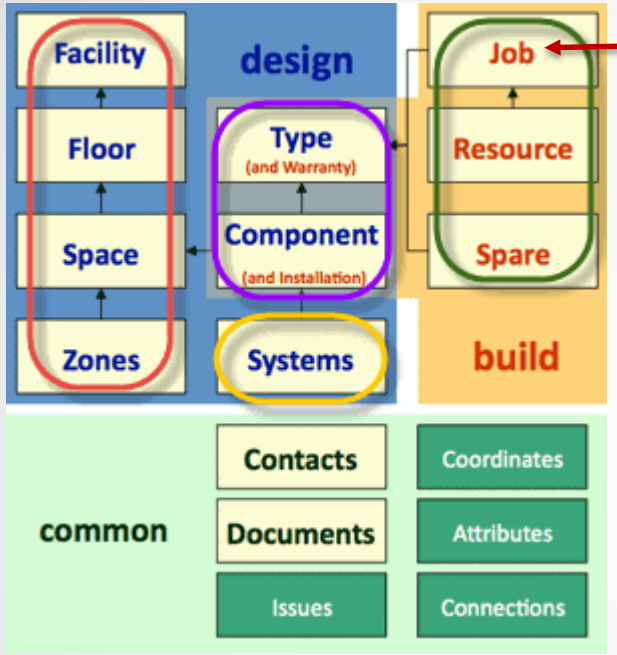
- When the design of **buildings components** (e.g., doors, windows, flooring, curtain wall systems) and **MEP systems** is approved, the design team submits **general information** about finishes, components, and equipment (traditionally documented in finish, product, and equipment schedules).
- As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

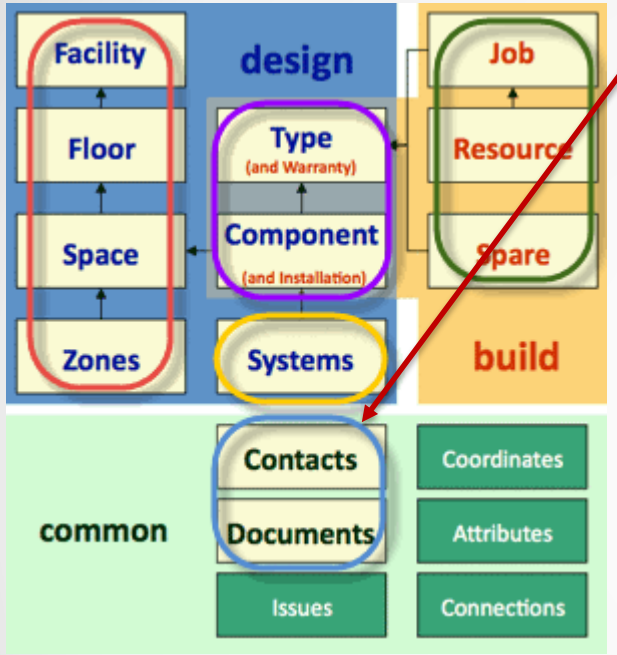
Progressive Data Delivery



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.

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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** the satisfies the Facility Information Specification.

Benefits to building owners (selling points):

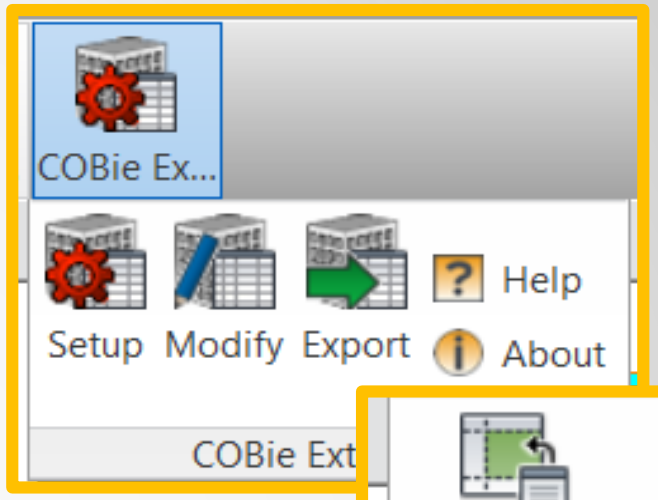
- Owners can define and receive **the information they need** to manage and operate their buildings on “Day One” of occupancy, with no lengthy (and incomplete) post-occupancy data collection.
- Owners can get all the information they **are already receiving** in an intelligent, electronic form that they 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.**

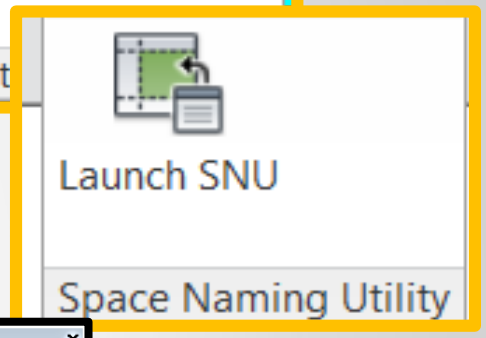
COBIE in Revit 2014: Tips and Tricks

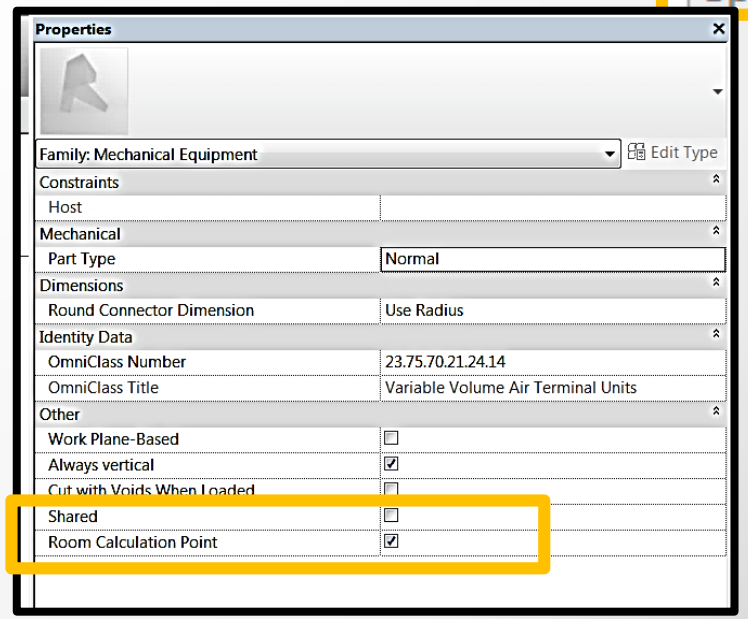
COBie in Revit

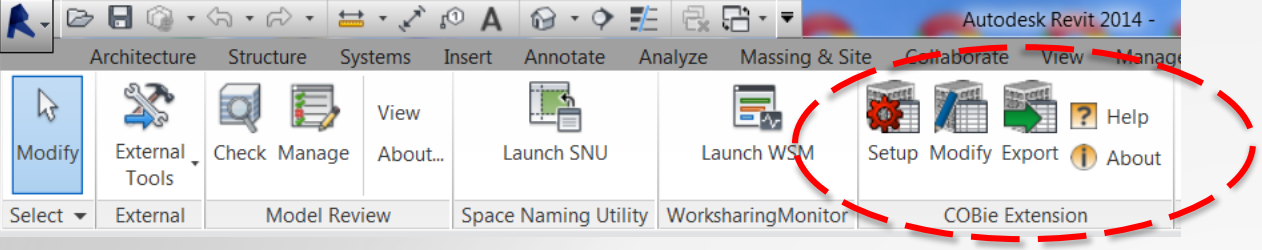
Tricks and Tips

- 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



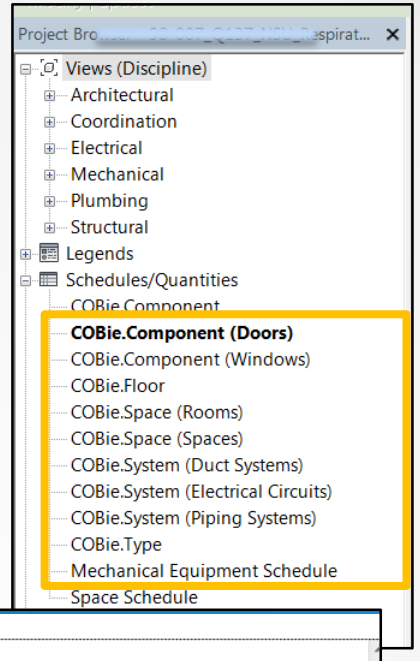


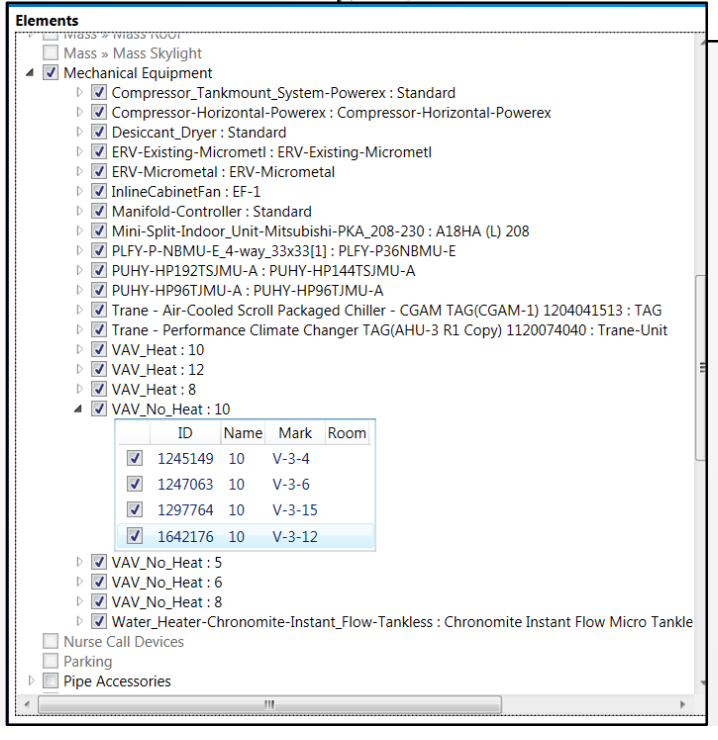


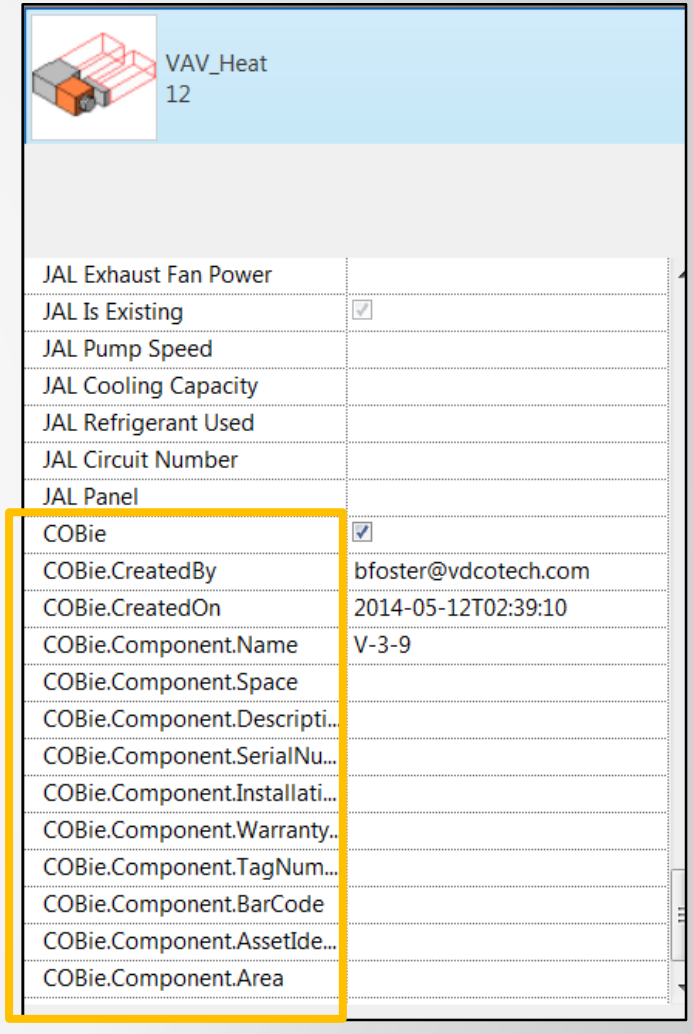


COBie Extension for Revit :

- 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**.







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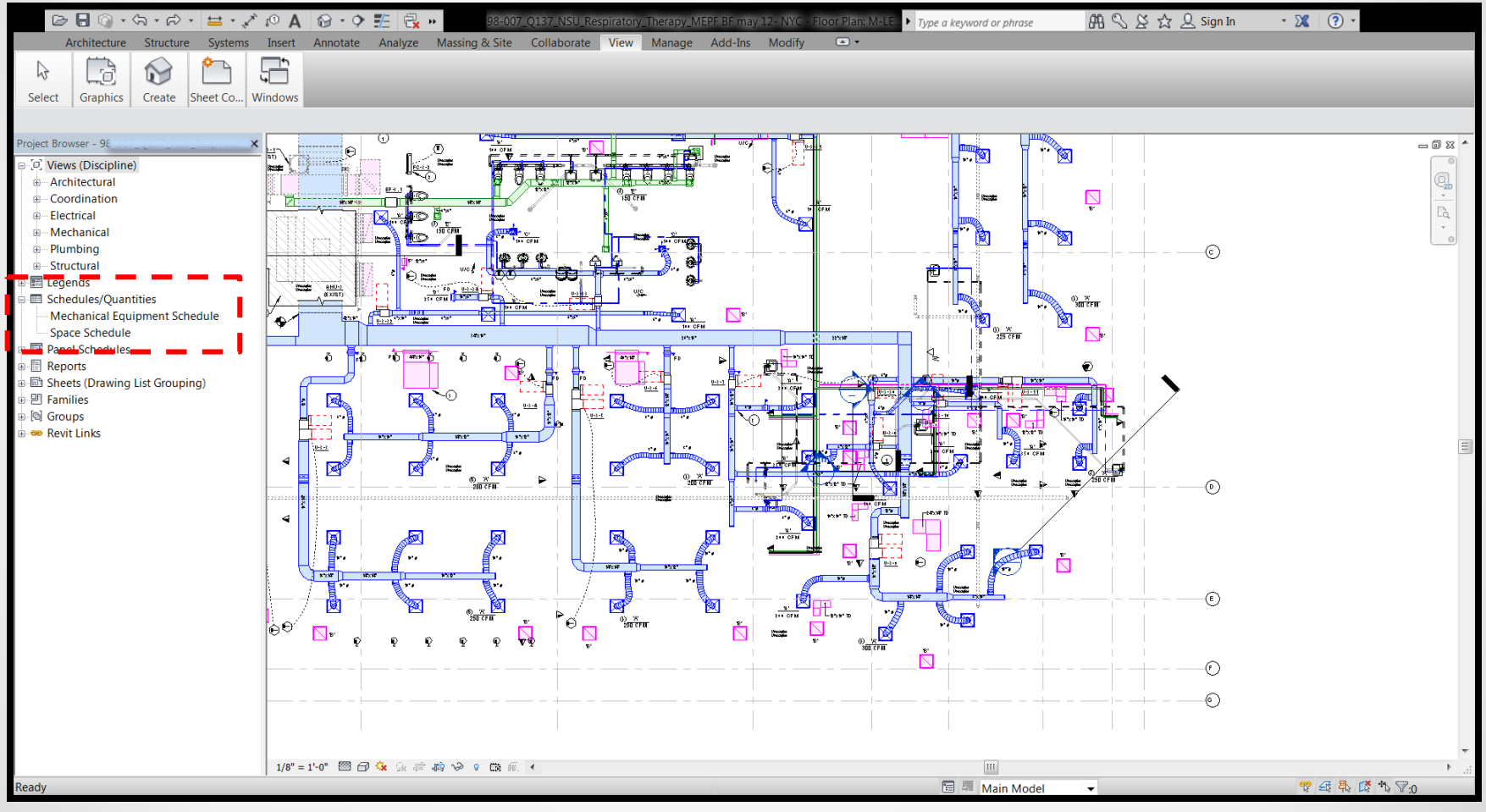

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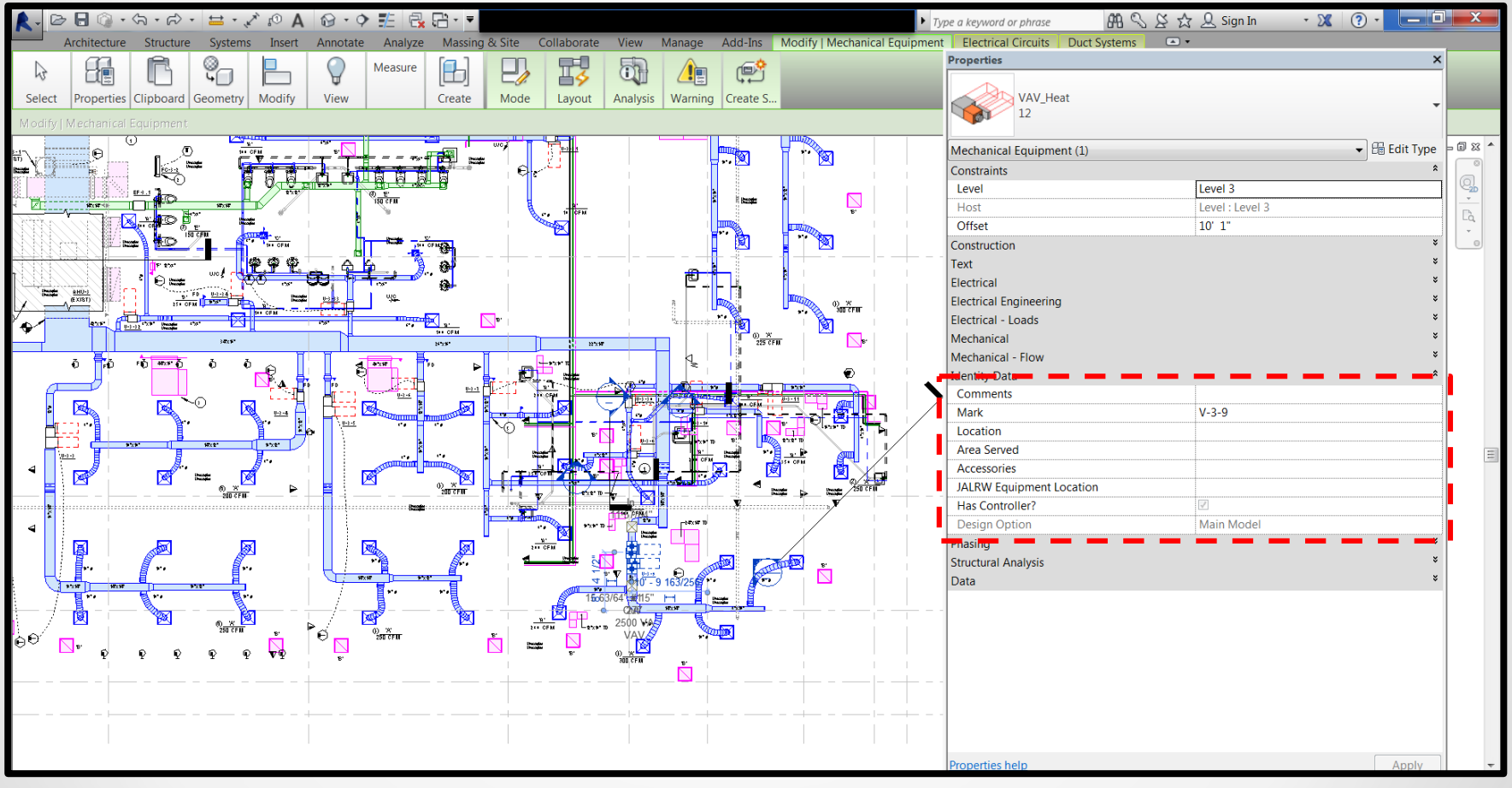
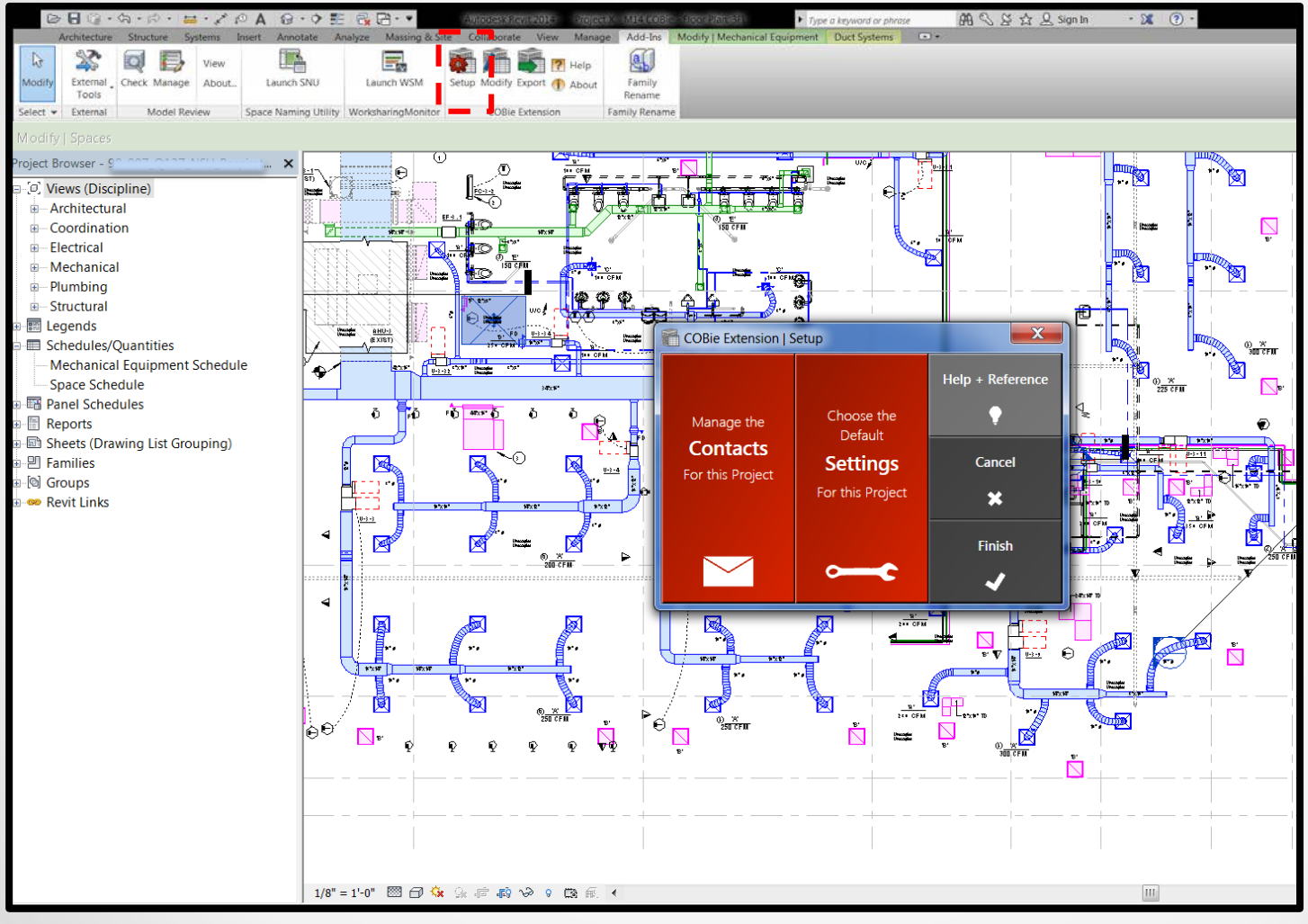


AUTODESK.

COBie Extension for Revit 2014:



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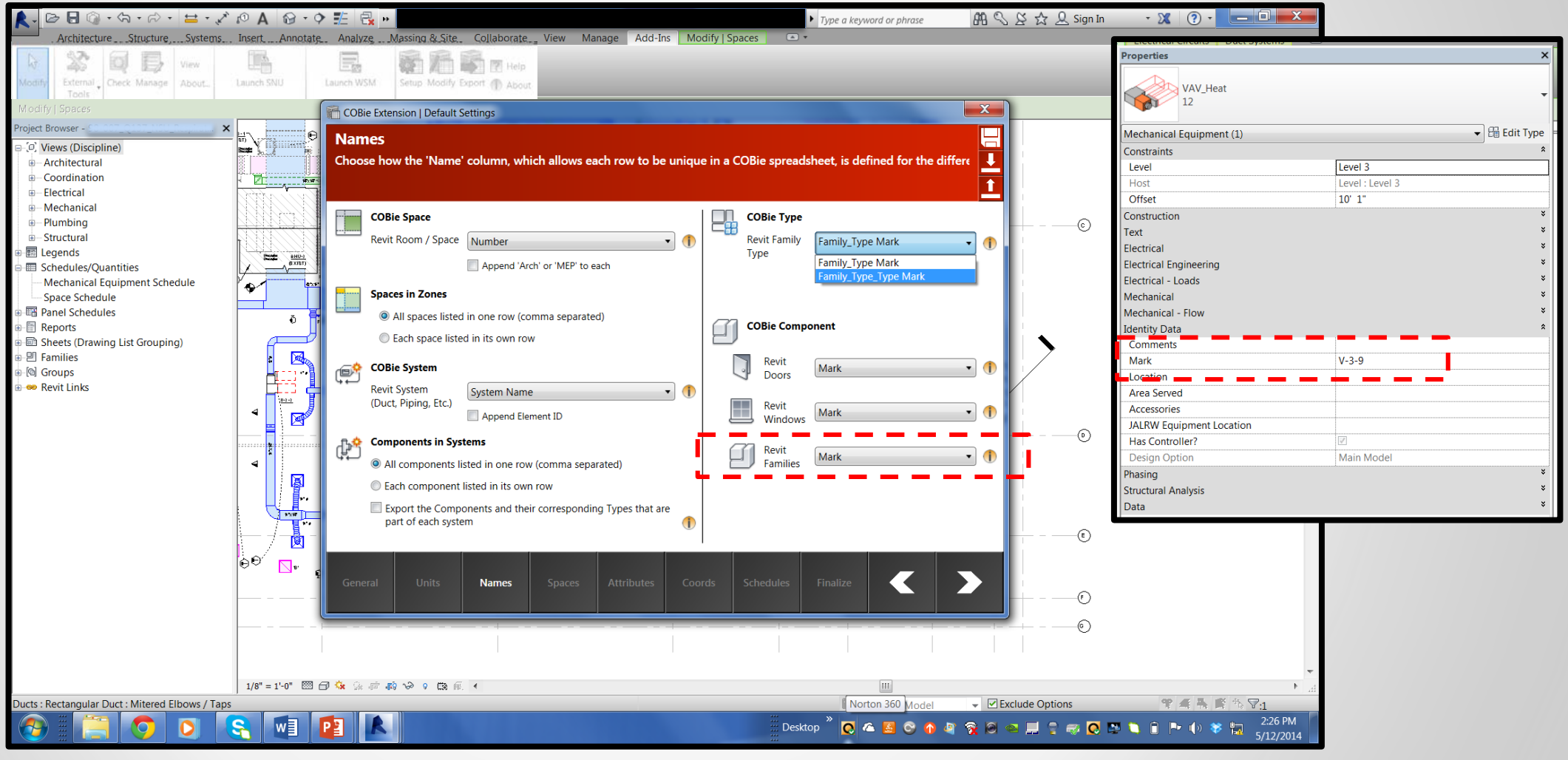

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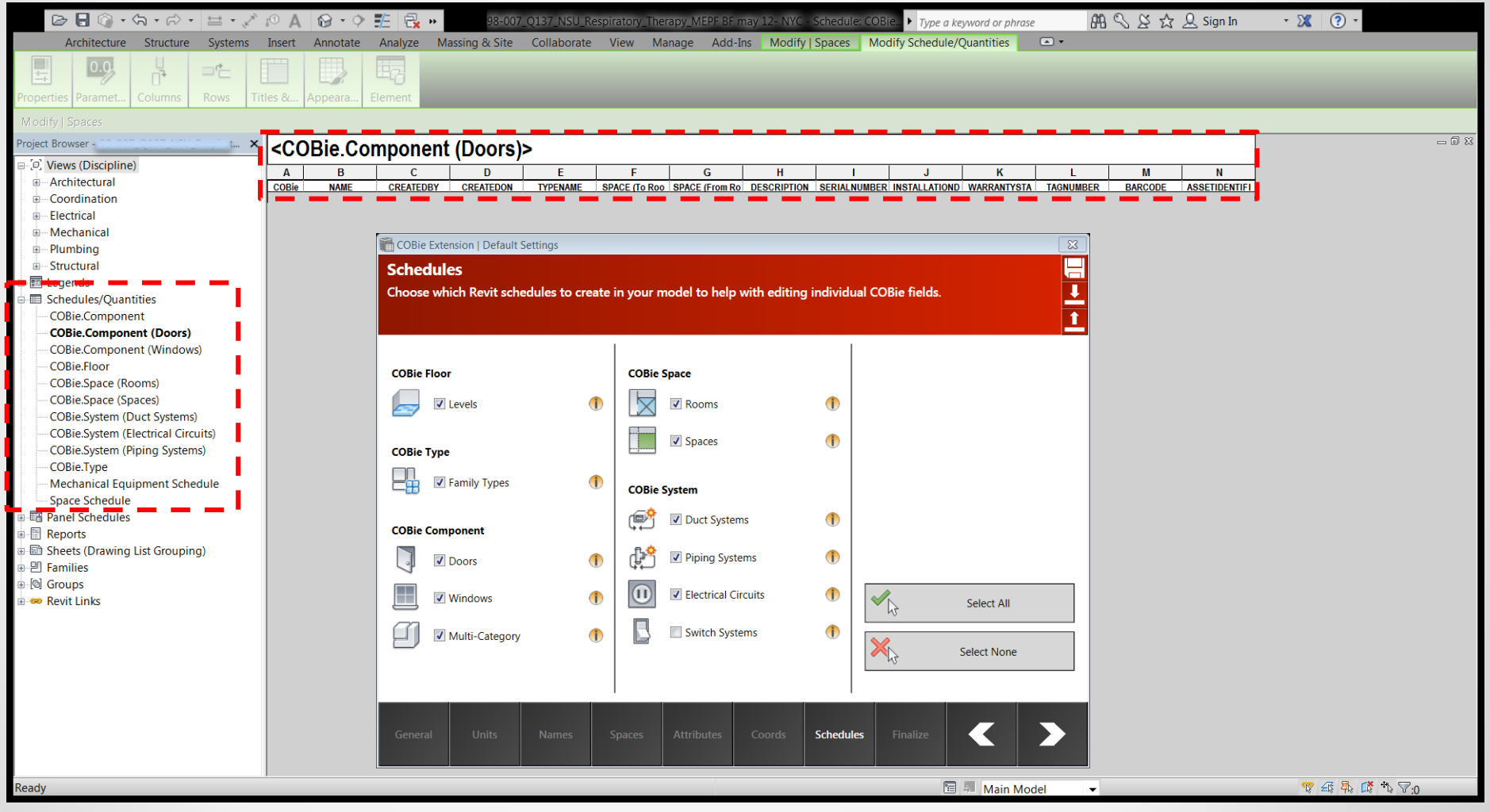

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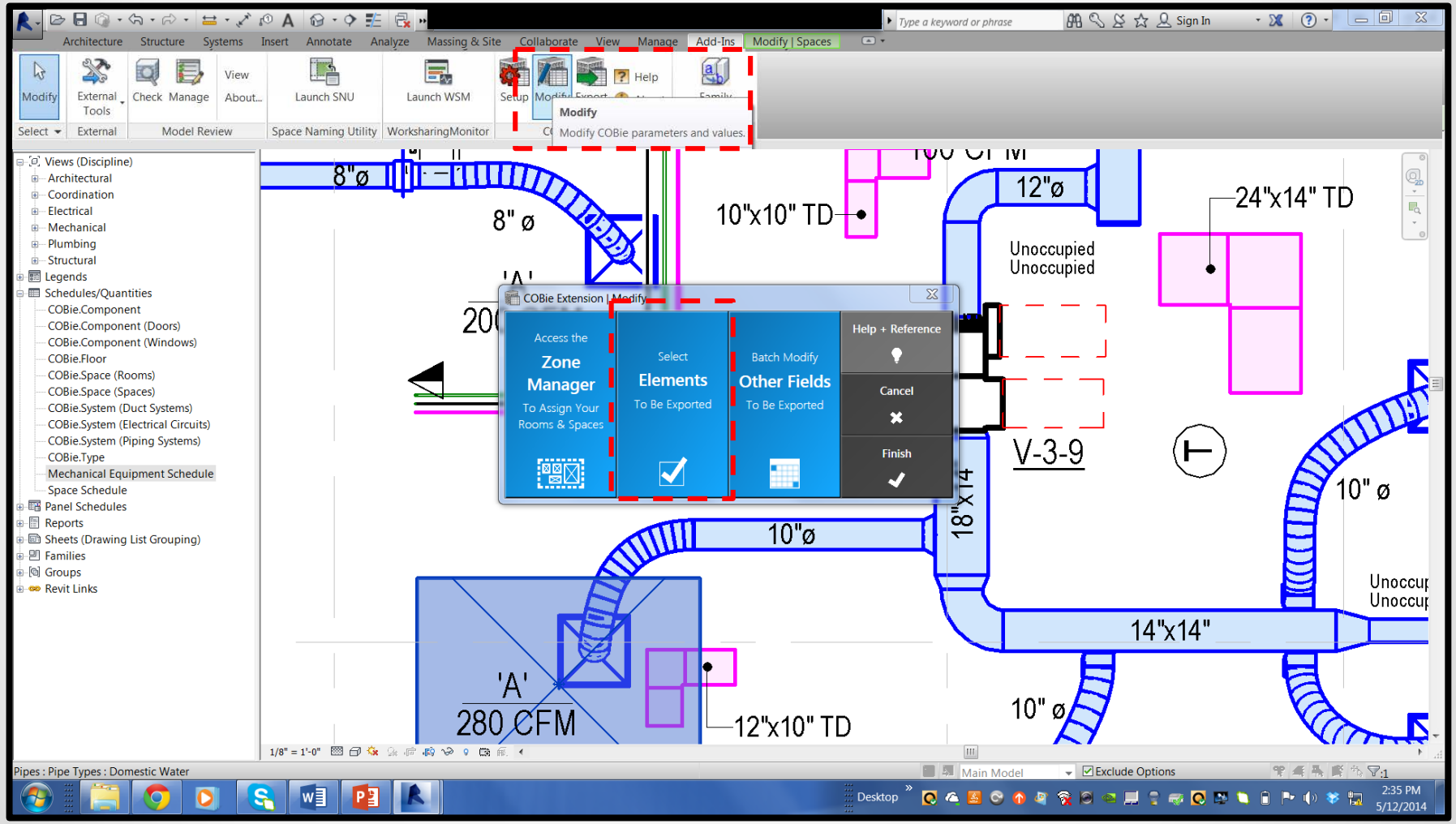

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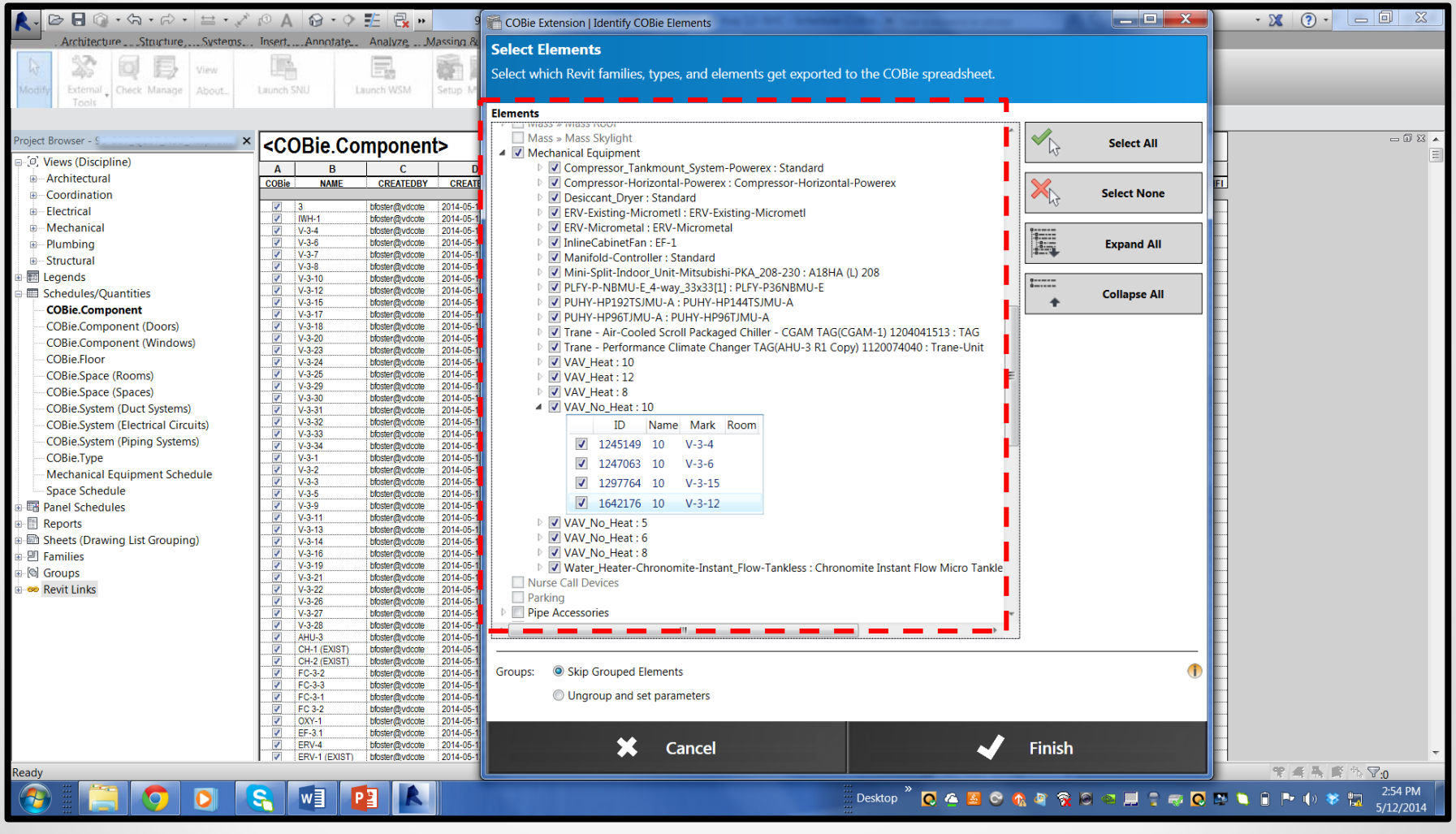

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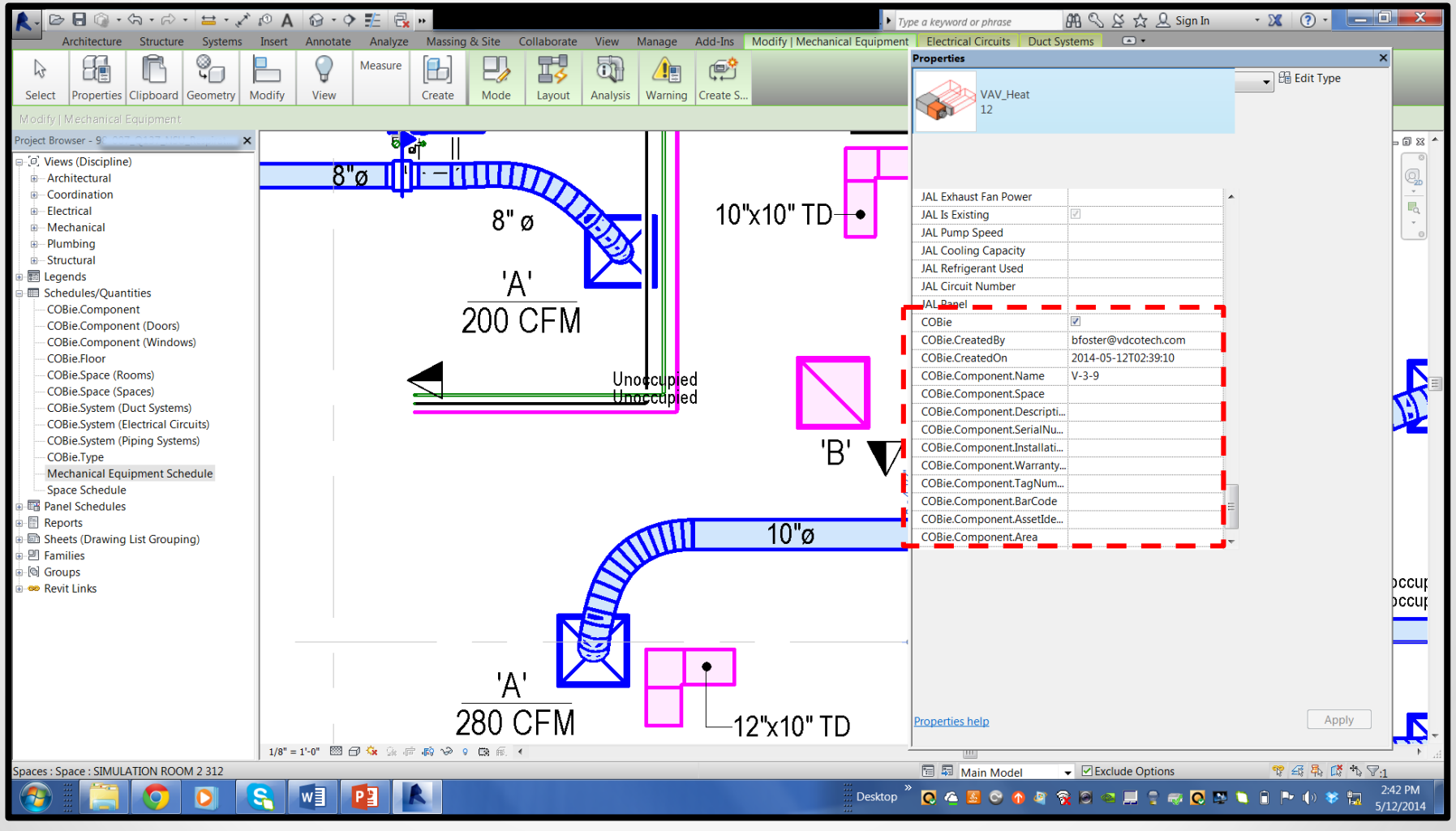

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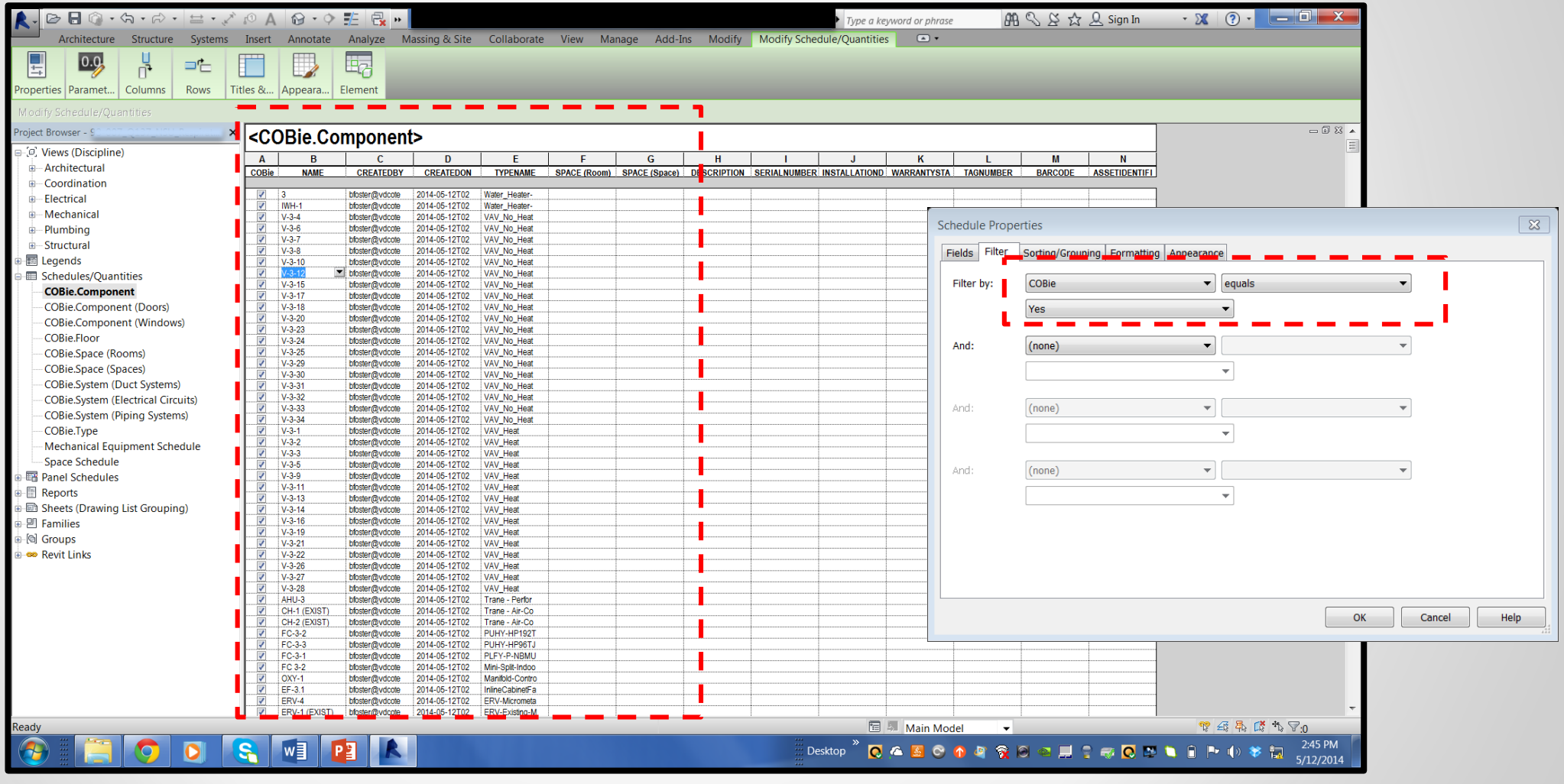

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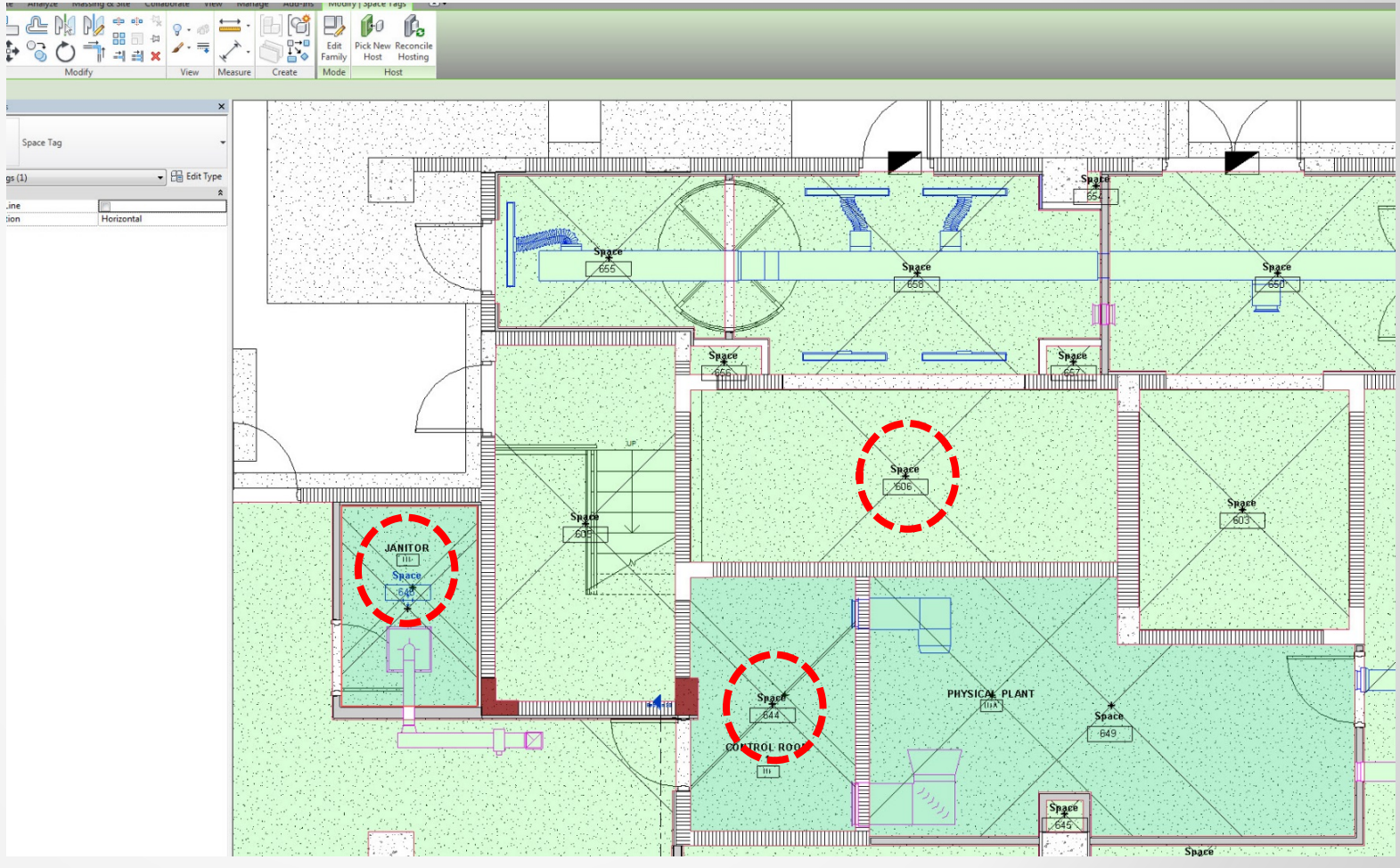
Revit Space Naming Utility:



Space Name = Room Name

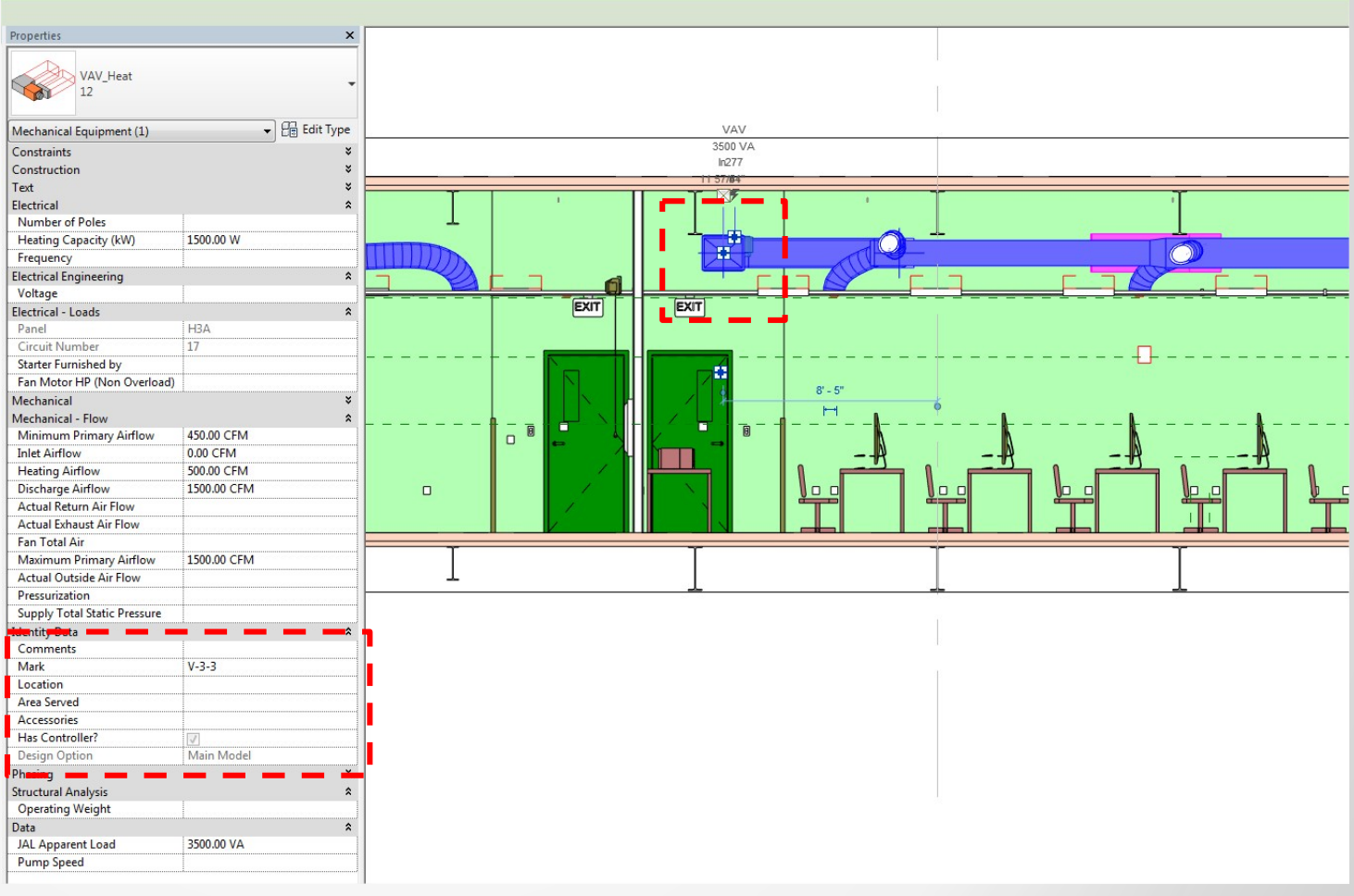
Revit Space Naming Utility:

- 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: 5					
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:



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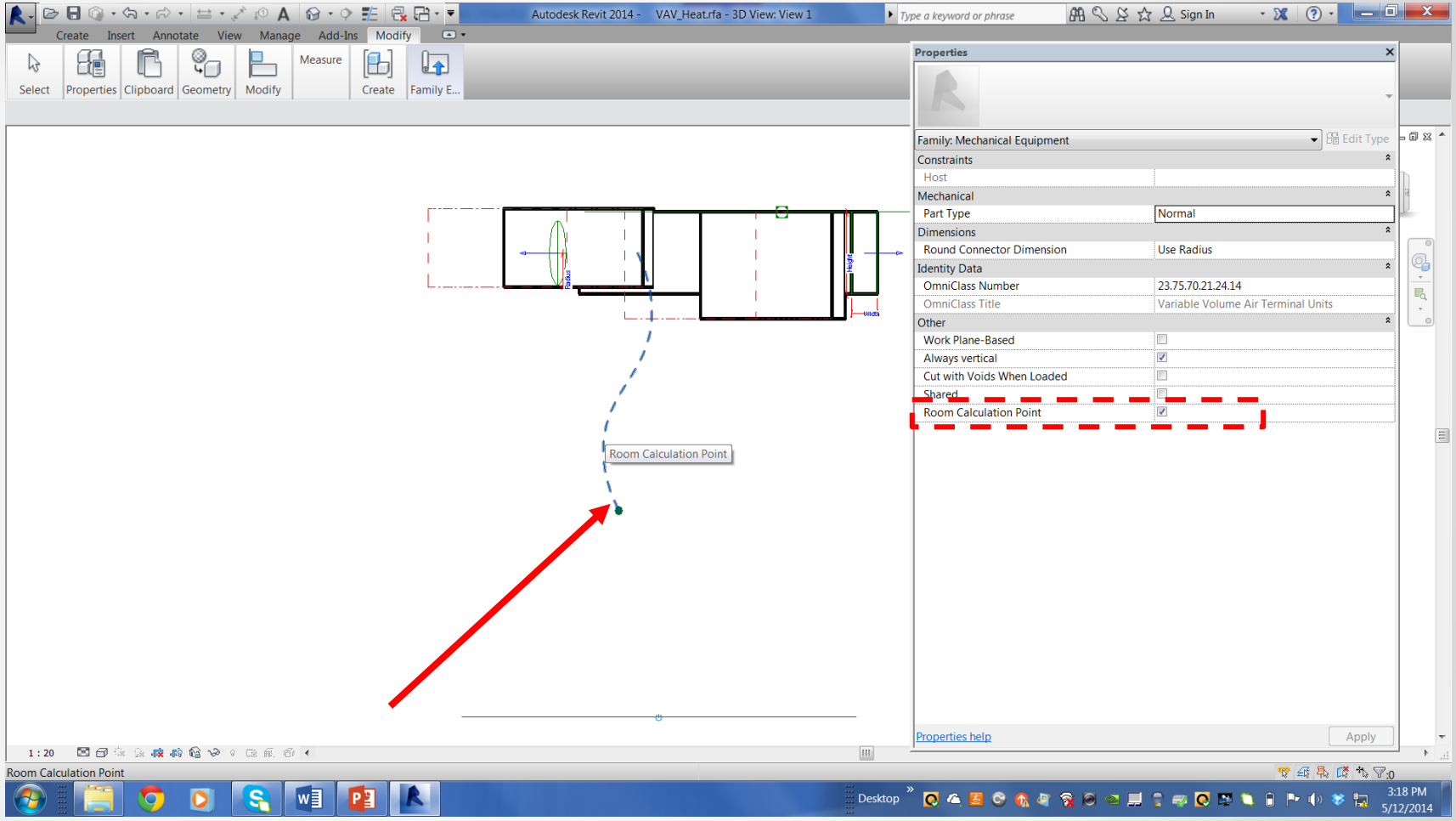

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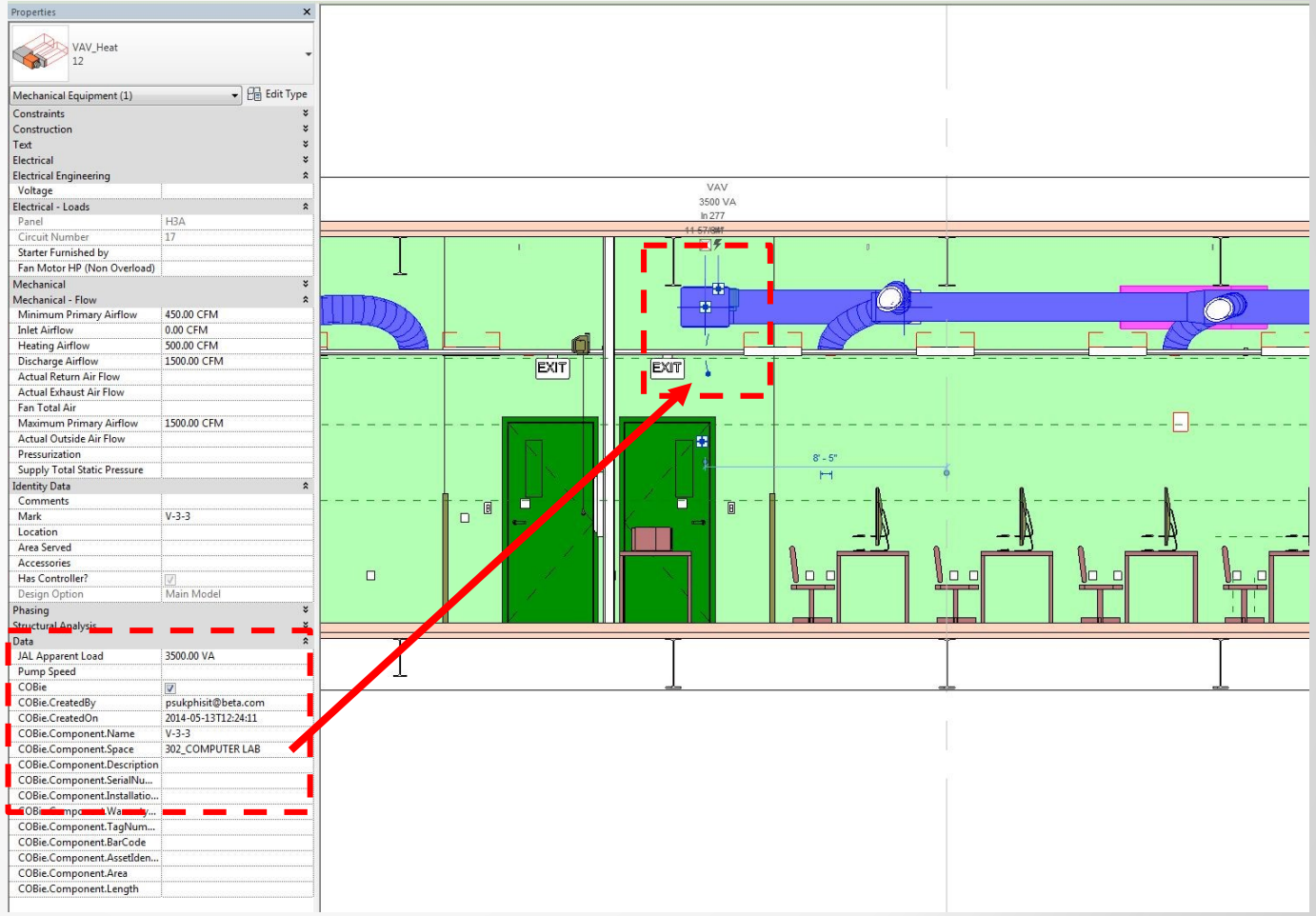
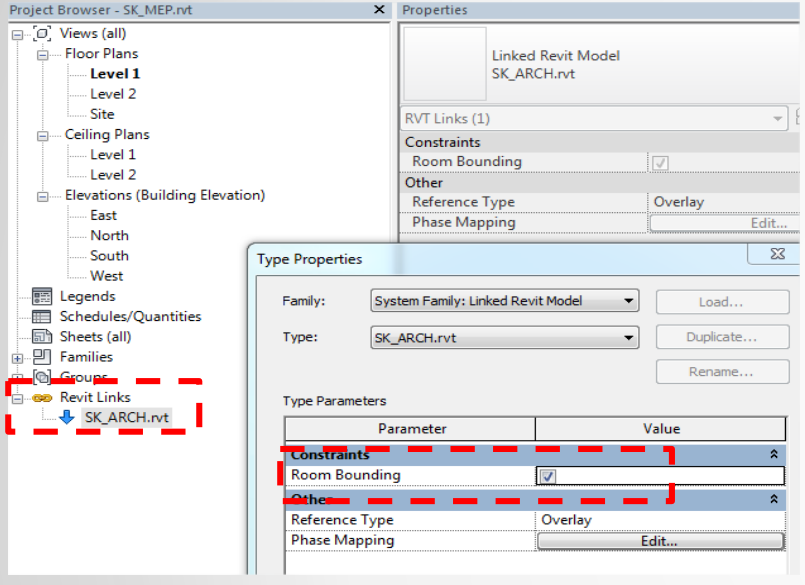
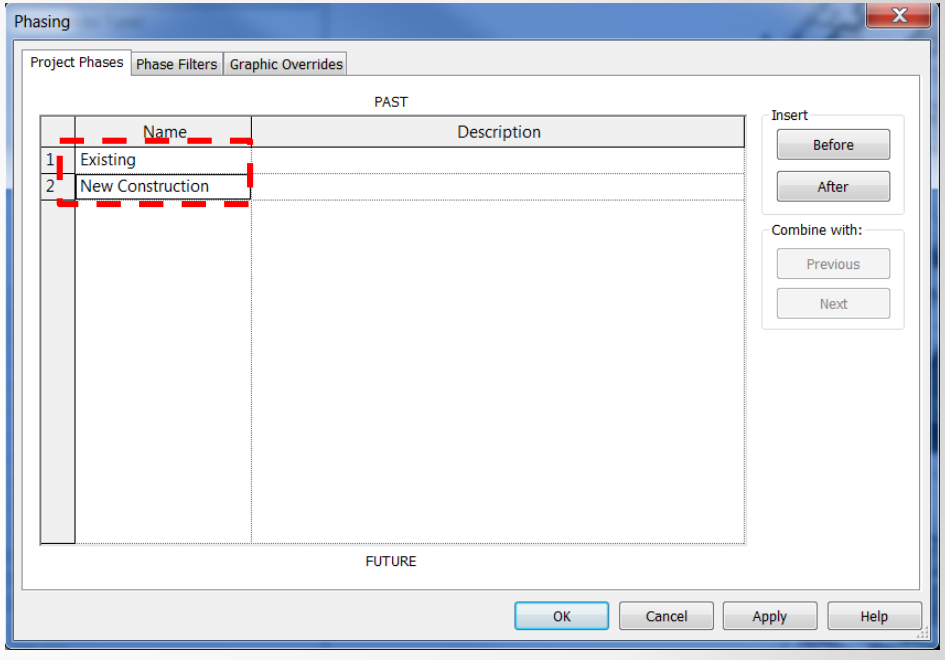


Revit Links : Room Bounding



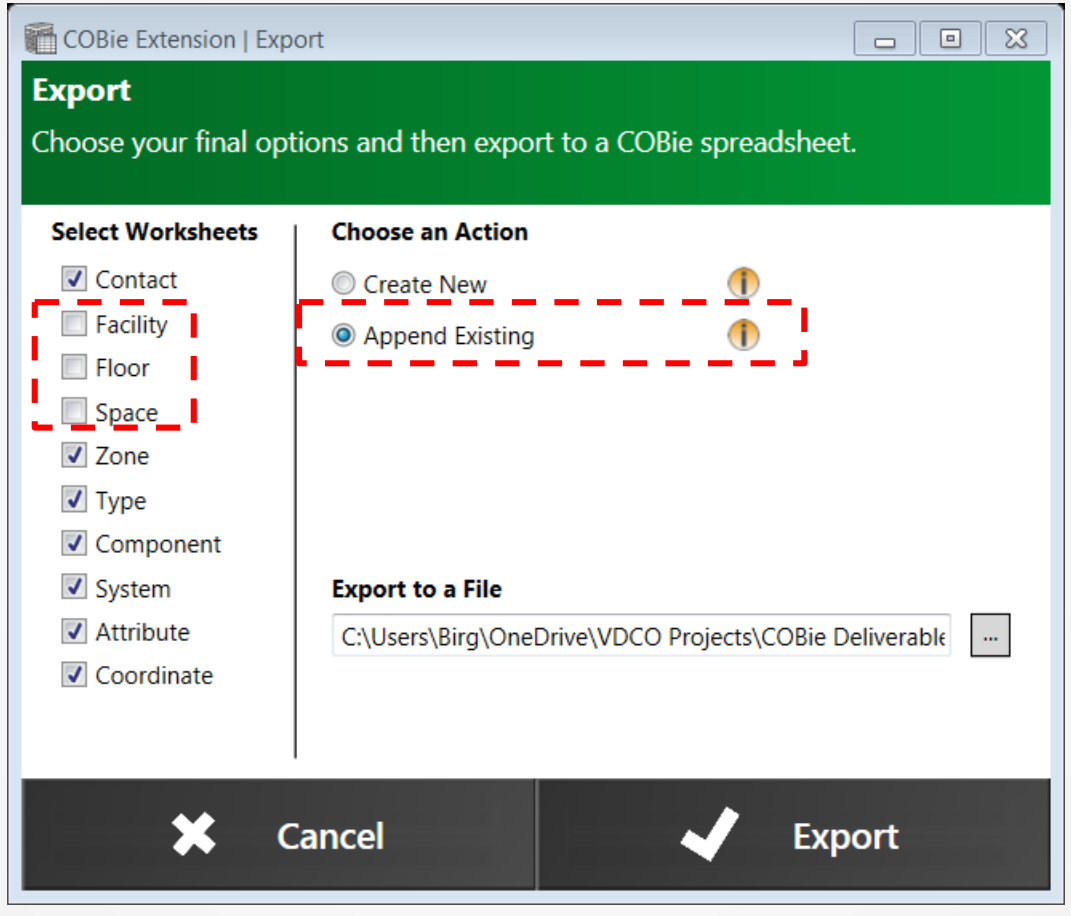
Revit Phasing : New Construction

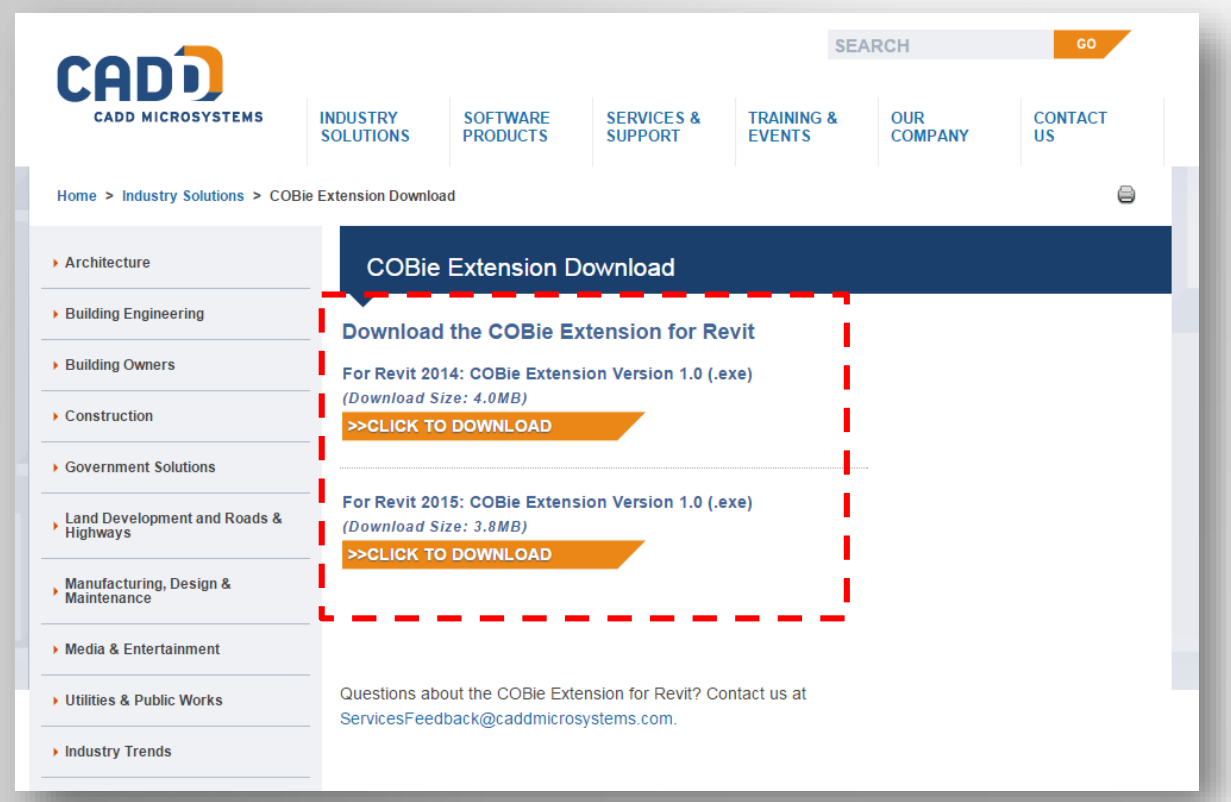


IMPORTANT TO CHECK

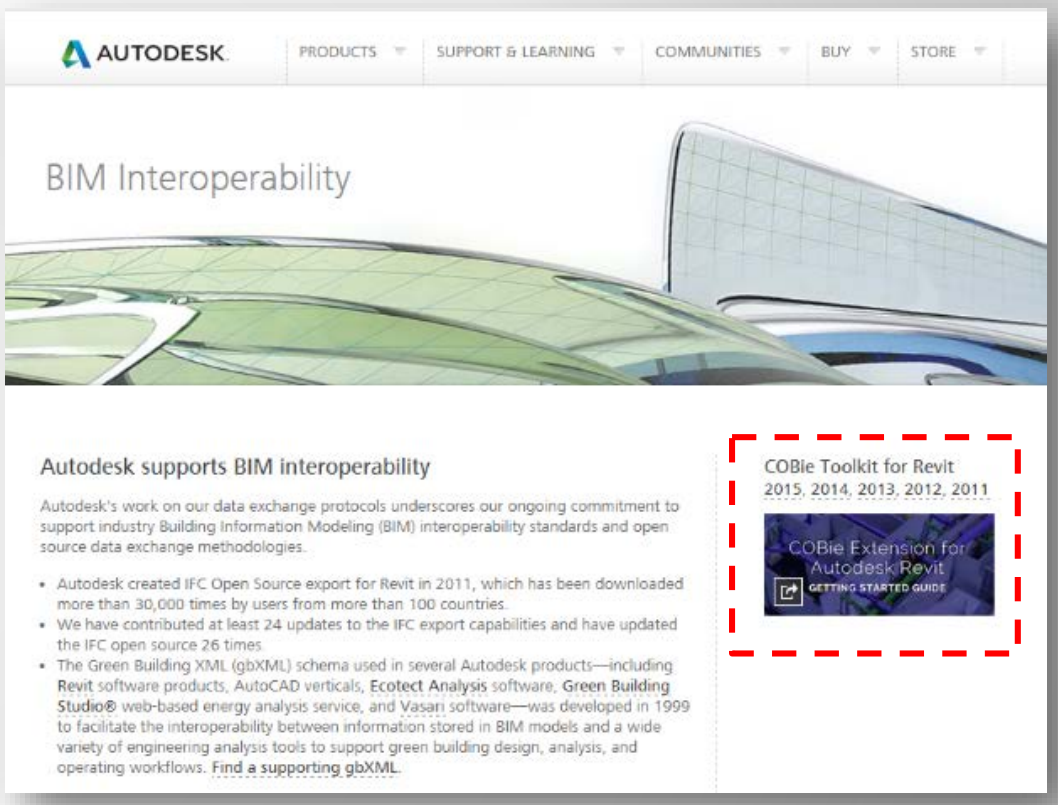
Revit Export

Mechanical – Basis
- Append :
  - Plumbing
  - Electrical
  - Architectural
  - Fire Protection





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



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

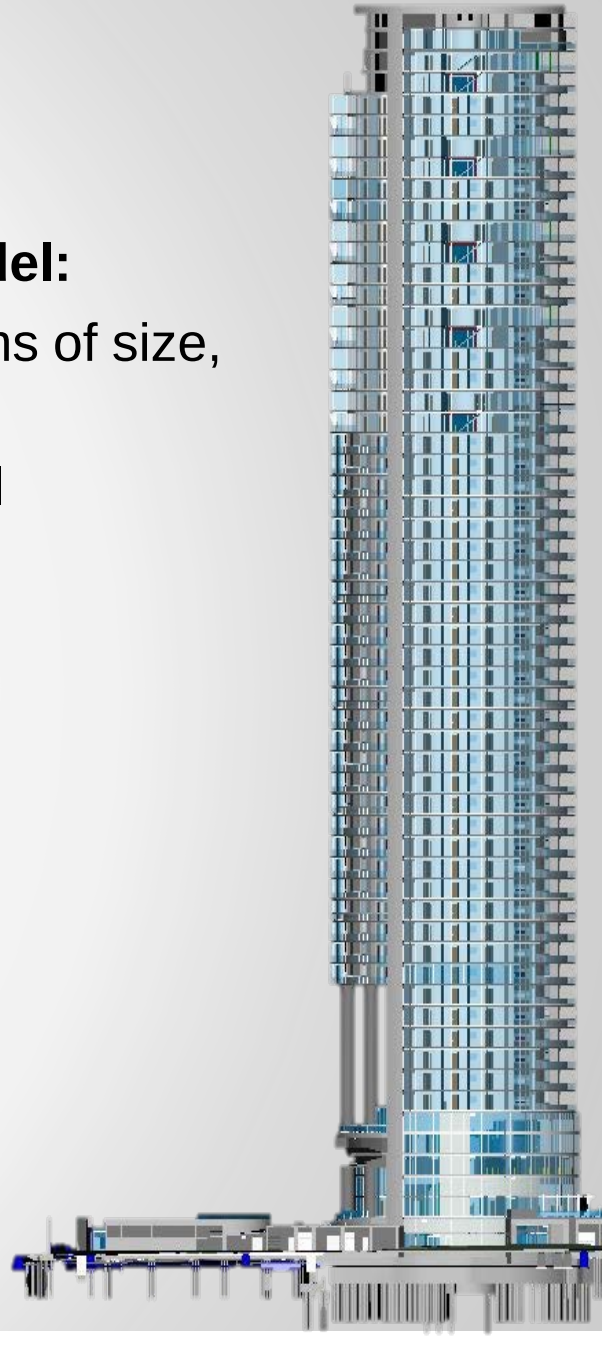
Insights from real-world BIM2FM implementations

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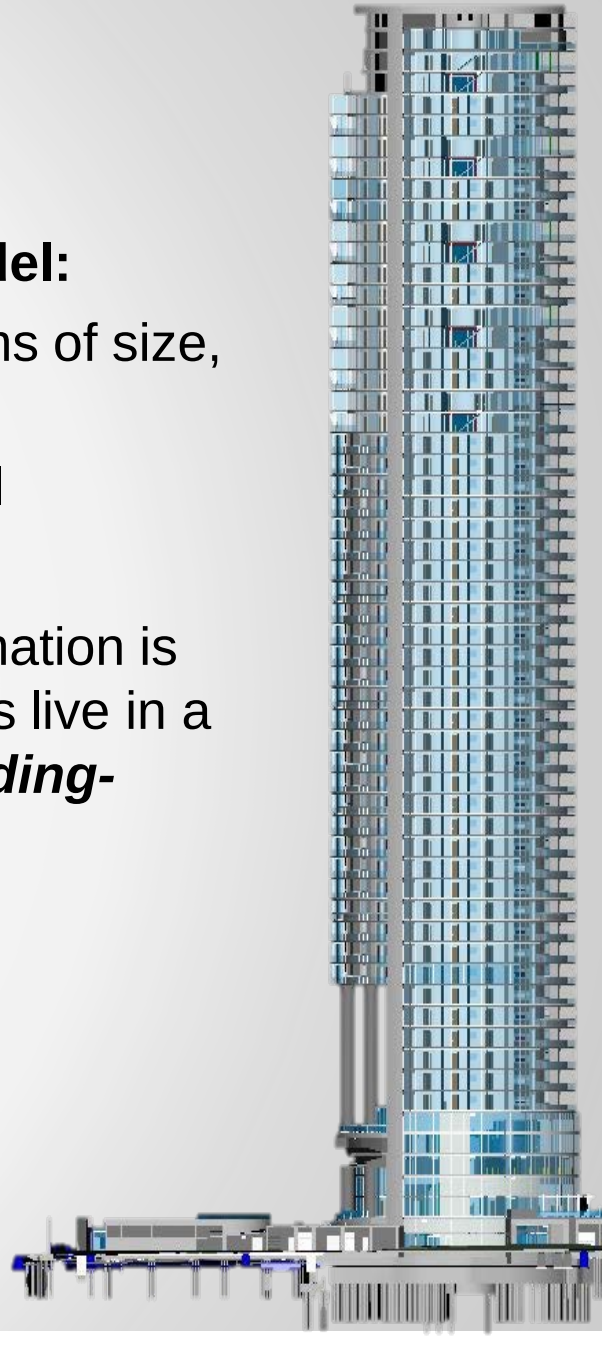
2. Project team members live in a ***project-centric*** world; information is stored in a ***project-based*** system. Building owners/operators live in a ***building-centric*** world; information must be stored in a ***building-based*** system.



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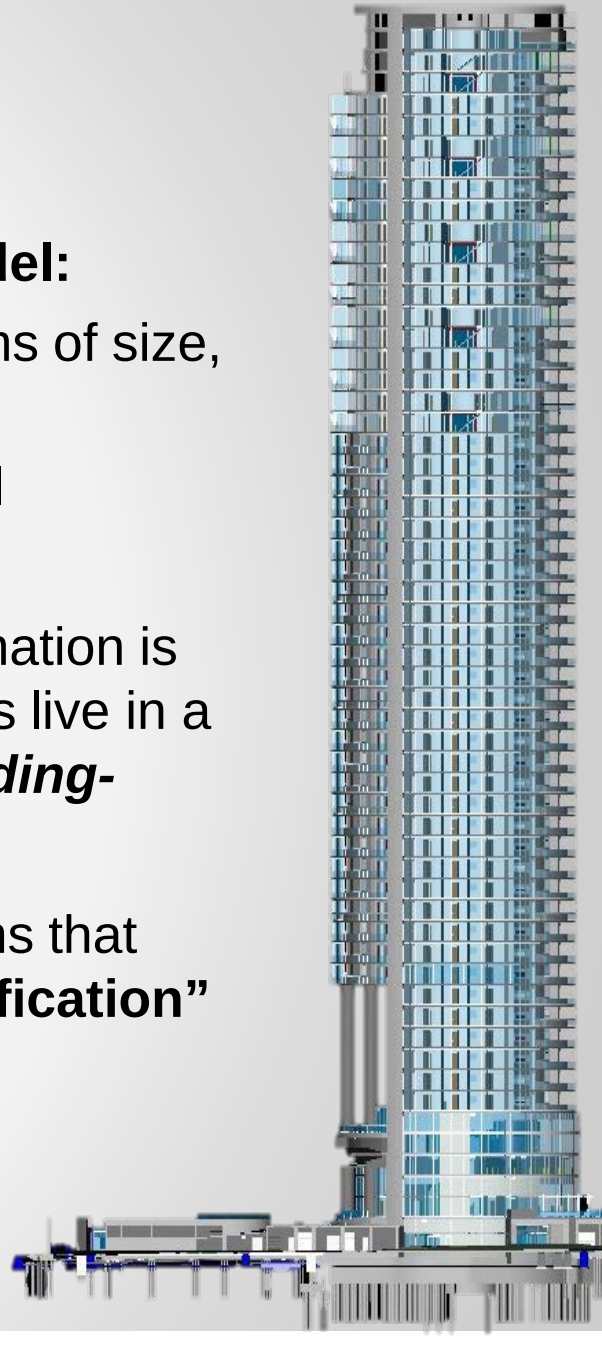
3. When discussing BIM2FM information deliverables, use terms that are meaningful to owners, e.g., **"Facility Information Specification"** instead of **"COBie Deliverable."**



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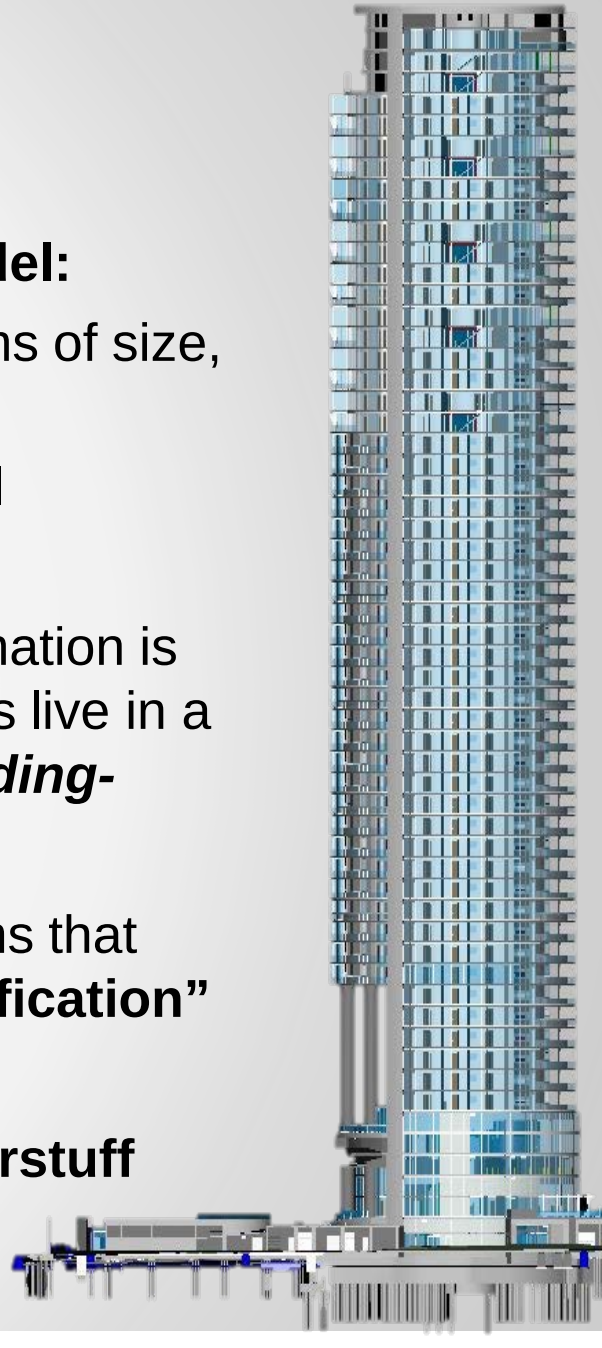
3. When discussing BIM2FM information deliverables, use terms that are meaningful to owners, e.g., **"Facility Information Specification"** instead of **"COBie Deliverable."**

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



Thank you!

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