



BU21912

## **BU21912 -Using BIM based Workplace Management tools for spatial analysis of facilities**

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### **Learning Objectives**

- Realize the value of utilizing Cloud-based Workplace Management Solutions to enable real-time analysis of facility spatial performance
- Understand best practice guidelines for creating and maintaining models specifically for facilities space management
- Find out how to take advantage of Building Intelligence Tools (BI) to enable the analysis of massive amounts of BIM data across an entire facilities and real-estate portfolio
- Learn how spatial data can be the foundation for organizing a BIM based facility portfolio

### **Description**

Building owners are now utilizing Revit models and information created during design and construction to streamline their own operations. To successfully track and report on facilities data a method to reference “places” in the building is needed, particularly with respect to occupants and assets. By understanding the details of how space is used, facility professionals can reduce vacancy and ultimately achieve major reductions in real estate expenses. In this presentation we will discuss how Cloud-based facility management systems with real-time bi-directional integration to a portfolio of Revit models enables space planners and portfolio managers to analyze spatial performance across an entire facilities portfolio. We will also take a close look how Cloud-based Business Intelligence Tools (BI) and distributed secure access to all members of a facilities team can ensure the spatial consistency and quality of Revit model data throughout the lifecycle of a facilities portfolio.

### **Your AU Expert(s)**

Brian Haines is a nineteen year veteran of marketing and product management of Cloud and desktop products specifically created for the building industry. Brian is currently the Vice President of Marketing at FM:Systems where he manages all aspects of marketing strategy and planning. Brian writes extensively on the topic of BIM and facilities and contributes a bi-monthly



column to Revit Community online and is an active blogger. Brian is a frequent speaker and has presented at events such as Autodesk University, IFMA World Workplace, NFM&T and the AIA convention. Brian currently serves as vice-chair for the National Institute of Building Science (NIBS) COBie Task Group (CTG)

Prior to joining FM:Systems, Brian was an Industry Marketing Manager in the Building Industry Group at Autodesk. His primary responsibilities included the Go-To-Market execution for the Autodesk Building Design Suite and several key Cloud Initiatives. Brian has a Bachelors of Architecture degree from the University of Arizona

Rob Norin came to FM:Systems with more than nine years of experience working with CAFM and IWMS solutions. While studying for a communications degree at George Mason University, Rob worked at Accenture on CAFM applications as a facilities generalist. There he developed the Aperture system to manage the onboarding of 40,000 new employees occupying more than 1 million square feet in India.

From there Rob went to Planex, a facility management consulting firm and FM:Systems business partner. During his five years with Planex, he worked with FM:Interact and supported, implemented and managed Aperture clients. He wrote help guides and training documents and provided technical support, training, product upgrades and other services for more than 50 organizations.

## Learn how spatial data can be the foundation for organizing a BIM based facility portfolio

By understanding the details of how space is used, facility professionals can reduce vacancy and ultimately achieve major reductions in real estate expenses. The room and area information in BIM models are the foundation for good space management.

### Space Data as a Foundation

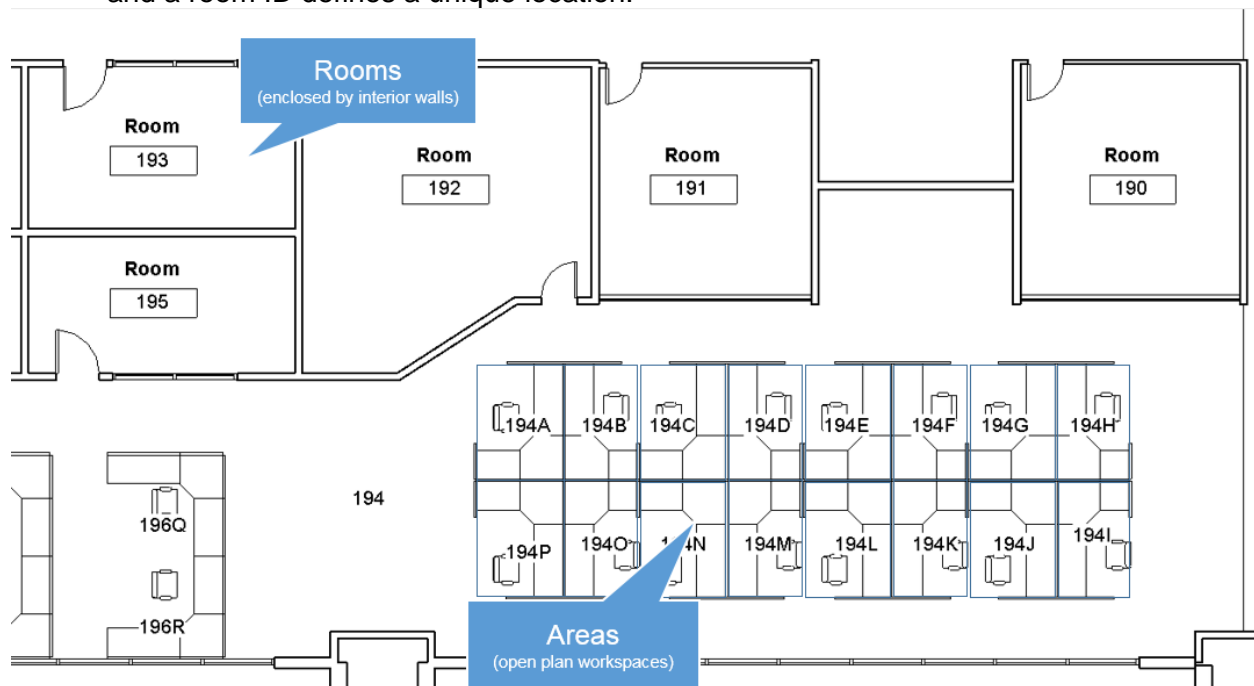
To successfully track and report on facilities data a method to reference “places” in the building is needed, particularly with respect to occupants and assets. Systems for tracking space should be established at two levels:

#### Rooms

Rooms are divisions of a building floor typically enclosed by interior walls and defined as “room” elements within the BIM model. Although there may be some cases of rooms that are defined by space separations rather than walls, rooms should generally be defined by space enclosed by walls.

It is critical that a room numbering system be established that corresponds to building signage and is coordinated with room finish schedules. Establishing this system may require a workflow step to transition between construction room numbers used for the building construction process and occupancy room numbers used for the operations phase of the building’s lifecycle.

Room numbers should be unique by building so that the combination of a building ID and a room ID defines a unique location.



*Example of rooms and spaces*

#### Spaces

In office buildings and buildings where occupancy tracking is important, it is essential to establish a system for tracking workspace areas. Where workspaces are closed offices

these will be identical to rooms, but for open plan workspaces multiple areas will exist within a single room. For that reason, a separate system is needed for areas. All spaces should be identified with space ID numbers that are unique by building, correspond to building signage and are used as the primary reference in the facility management system for occupancy management, move management and facility maintenance.

## **Understand best practice guidelines for creating and maintaining models specifically for facilities space management**

The BIM FM Model will serve as the “live” data source used throughout the life of the building. As such it is important that there be enough information to support building operations, but not so much as to become burdensome. Attempting to track more data than can be practically updated can result in data of uncertain accuracy, making the entire system untrustworthy. Therefore the temptation to track too much should be resisted and a “lean” approach is recommended.

For the purposes of this course we are going to run through the following basic modeling exercise focusing on quickly creating a very light weight Revit model for Space Management in a facilities environment.

In this brief exercise we will explore how to create a very basic Revit model with an appropriate level of detail for it to be used for space management by facility management teams. We will assume that you have at least a basic knowledge of how Revit works including views, menus, the project browser etc.

We will also be focusing on the creation of walls, doors, rooms and areas and will begin the exercise by importing an AutoCAD .DWG file of our corporate office as a background for the creation of our basic FM model. These files are available for download from the AU class site or by contacting me directly at [bhaines@fmsystems.com](mailto:bhaines@fmsystems.com)

Let's get started!

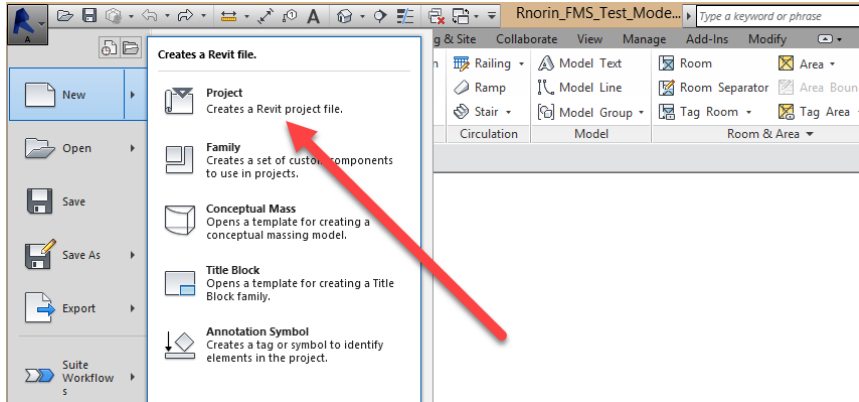
### **Creating a new Revit Project for your FM Model**

1.) Open Revit



2.) Click on the Application Menu (Figure 1) and select New>Project

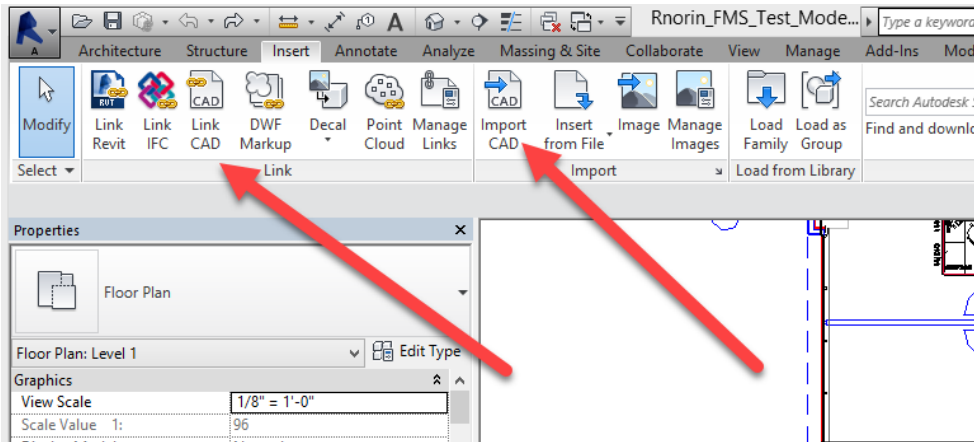
3.) Choose the default architectural template and click ok



### Importing an AutoCAD background file

There are 2 ways of getting an AutoCAD background file into Revit. These are called out in Figure X below. An imported file is embedded into your Revit model and is not updated when the underlying AutoCAD DWG is updated. Linked files maintain their connection to the original DWG and can be “re-loaded” each time the DWG is updated in AutoCAD if the link is intact. Linked files is the preferred method for background drawings as they can be updated separately overtime in AutoCAD if need be.

The other advantage of linking AutoCAD drawings is that they cannot be exploded inside of Revit. If you import the DWG you can explode it which is NOT RECOMMENDED due to an unnecessarily increased Revit file size.

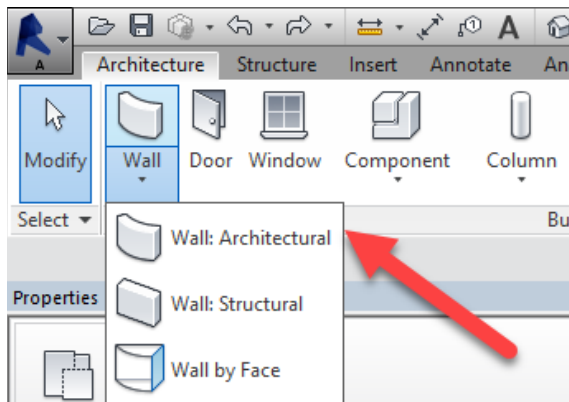


- 4.) Select the Level 1 Floor Plan view in the project browser
- 5.) Select the “Insert” Menu drop-down and then select “Link CAD” as show in figure X above.
- 6.) Browse to the location of your background AutoCAD floorplan.

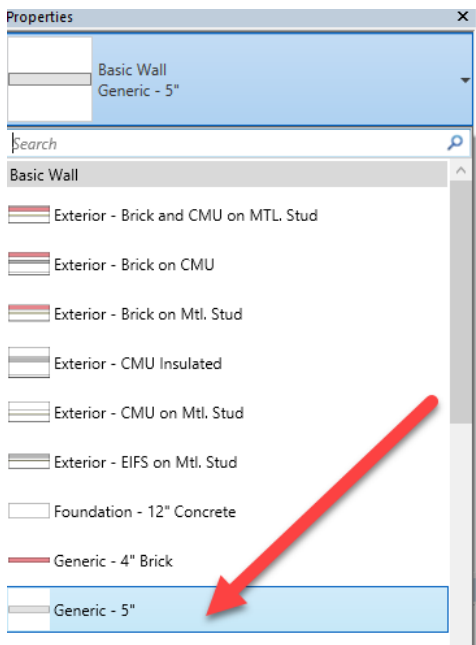
## Tracing over your AutoCAD walls

Revit does a nice job of identifying your actual walls when using the “Wall” command from the Architecture Tool bar. It doesn’t automatically generate a model from your AutoCAD background but it does do allow you to identify wall centerlines on your CAD drawing and allows you to snap quickly to place generic walls which is what we are going to do for this exercise. A number of generic wall types are available in Revit out of the box however you can create your own (which is beyond the scope of this exercise).

- 7.) Select the Walls command from the Architecture toolbar and pick Wall:Architectural from the drop-down list of wall types



- 8.) If you are using our sample model for this exercise select a Basic Wall 5” Generic for the interior wall partitions and trace over all of the interior partition walls snapping to the locations of the existing walls in the drawing.



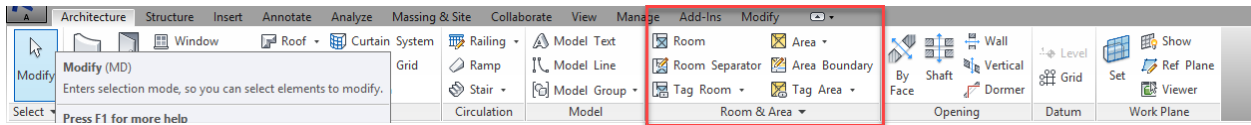
- 9.) Once this is complete create an exterior wall around the outside perimeter of the building. For our example I used a Basic Wall –Exterior – EIFS on Mtl. Stud. It is important that all of

your rooms “close” as this is a requirement for creating rooms which will be getting too shortly.

## Rooms and areas in Revit and Revit Architecture

2 methods exist for creating space for FM in Revit (not to be confused with Revit MEP spaces for MEP calcs). Rooms require walls or room separation lines to be created in Revit and are fairly straight forward. Areas on the other hand are a bit more complex and are absolutely necessarily in today’s highly dynamic office environments where space is much more open and flexible. We will step through the creation of each type below.

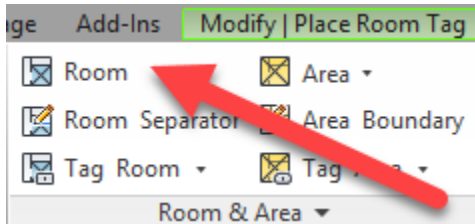
\*Note - Keep in mind that rooms and areas are separate functions within Revit and they are not aware of one another!



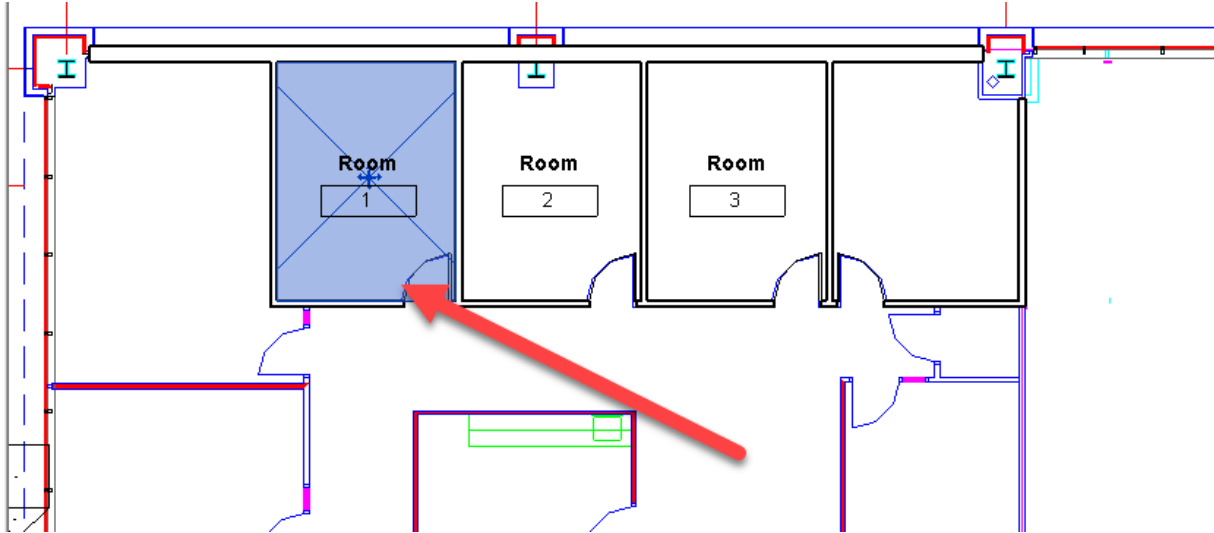
## Creating Rooms

All room areas are determined by the existence of walls or room separation lines. Once you have these created in the previous steps it’s time to generate your rooms from the walls etc. that you have newly created.

- 10.) On the Architecture menu select Architecture>Room then hover your cursor over the rooms you just created and you should see an X that covers the area for that particular room. Go ahead and click into the room and the room should now be created. Go ahead and do the same for the remaining rooms in your floor plan.



To make it easier to identify the rooms that we have created we will now tag the rooms with uniquely identifiable information such as room number.



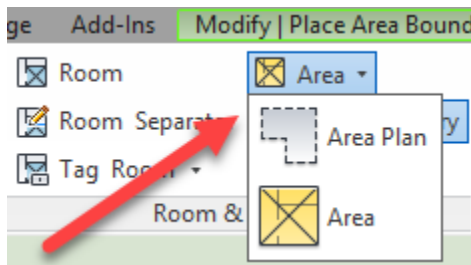
Placing Room Tags

## Creating Areas

Areas are more flexible when you have space that needs to be delineated for purposes that don't typically have walls such as for cubicles and touch down spaces in an open office environment. Areas can be created in a more adhoc manner and their boundaries can be defined by you by choosing from a pre-defined area shape or by drawing lines to create the areas. Areas are used in conjunction with Areas Schemes to enable us to look at space in a number of different ways including gross area of a floor vs. rentable areas etc.

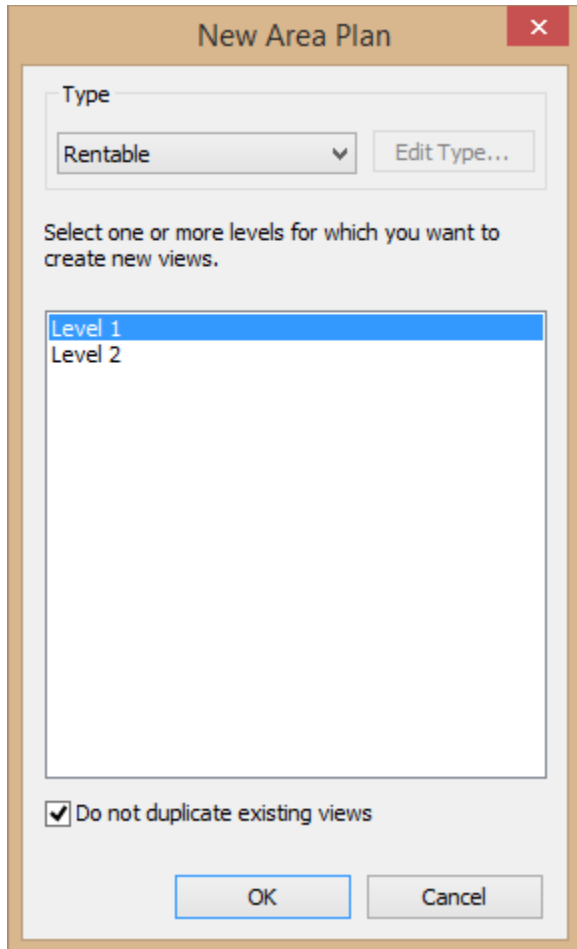
To begin creating areas we need to first create an area plan. Area plans are views that show spatial relationships based on area schemes and levels in your model.

11.) Create the Area Plan – Select Architecture>Area>Area Plan



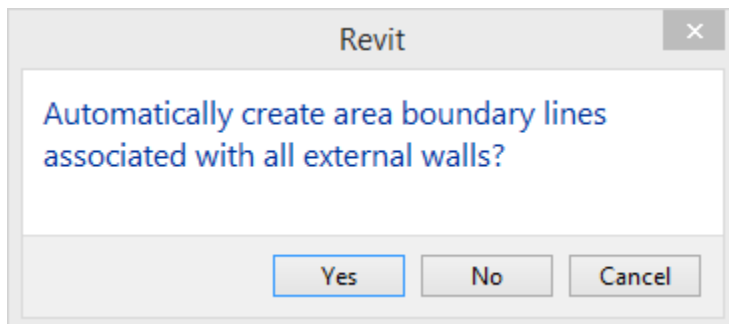
12.) For this exercise we want to create a “rentable” area plan on Level 1 of our model that we have created. Select Rentable>Level 1 as show below.



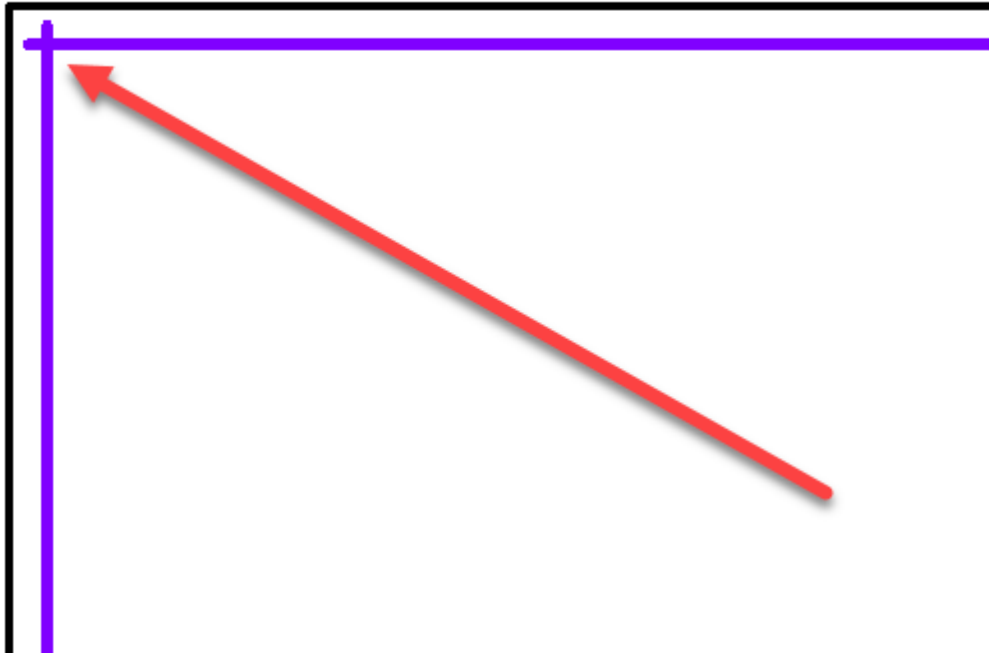


\*Note – Revit will occasionally struggle with creating the exterior gross boundary lines around the outside of your building. This happens often when items such as exterior columns, window walls etc. “break” the continuity of the gross areas boundary. I recommend that you identify these areas where the purple gross exterior boundary is broken and manually correct these to ensure you have a properly created gross area plan.

13.) Select Yes to create area boundary lines associated with external walls as shown below



Once Revit generates the external boundary lines they will show up in purple as shown below.

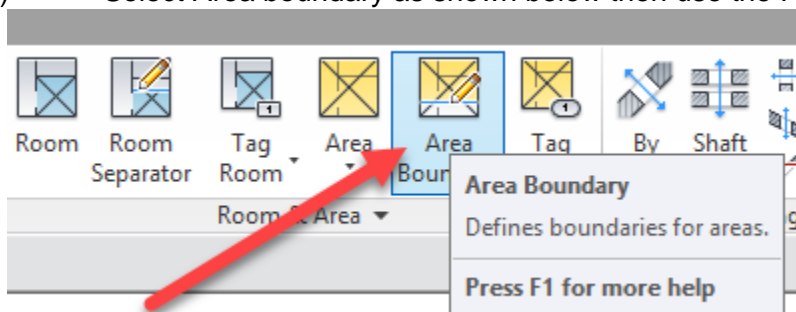


Now it's time to actual begin creating our areas. Keep in mind that creating areas is key to success especially in open office work environments where physical boundaries are not typically created by walls.

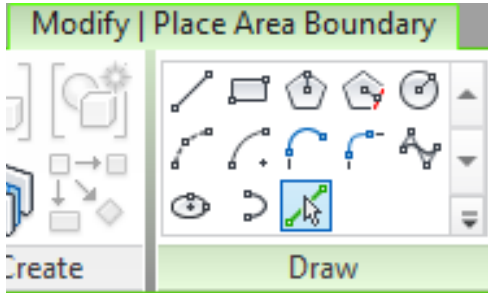
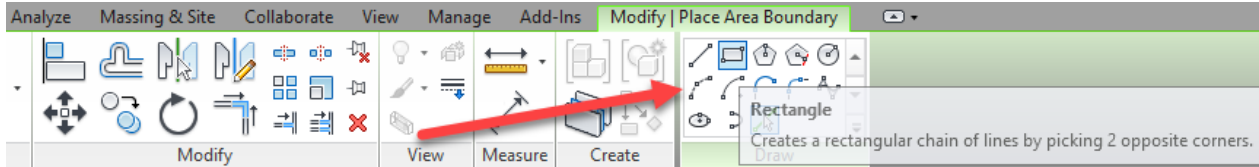
Area boundaries define usable space in buildings. You can define these areas by drawing them or by picking walls.

In our exercise we will draw boundaries around cubicles that have been built in an open office environment. We will then tag these areas so that they are identifiable and the data associated with each space can be leveraged for space management purposes.

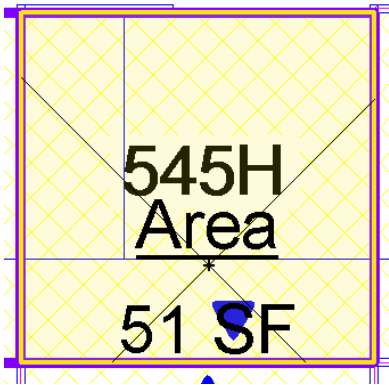
- 13.) Select Area boundary as shown below then use the Place area boundary tools.



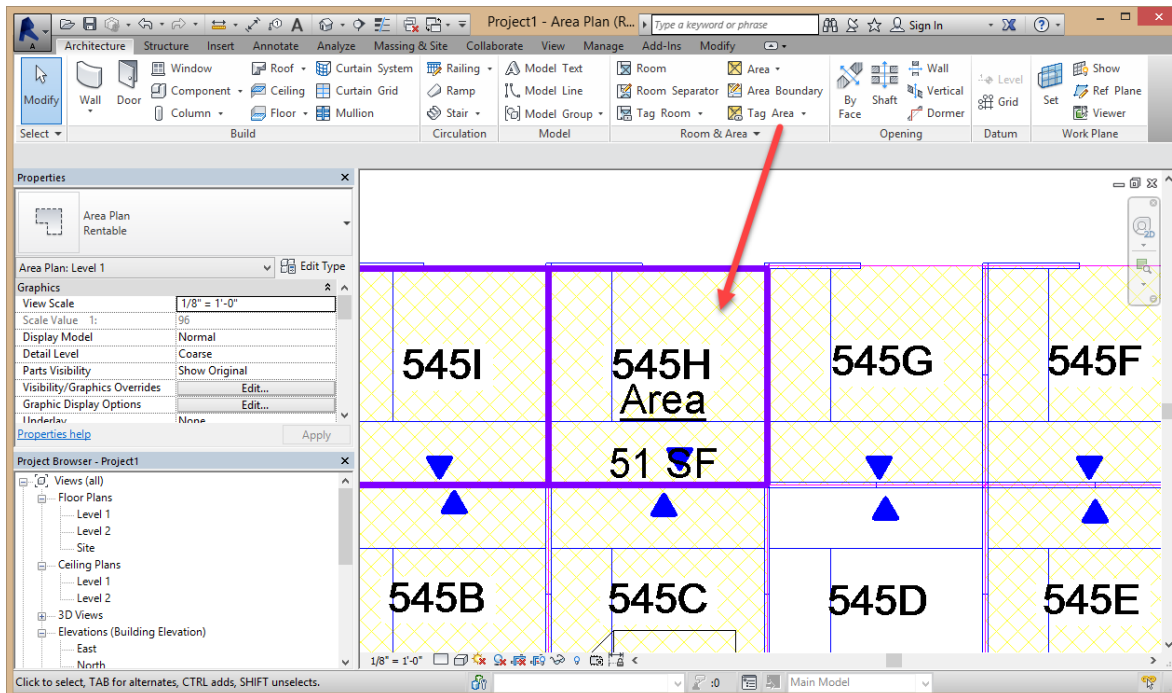
- 14.) In our example we will use the Rectangle tool to quickly create area boundaries around our cubicles.



15.) Click on the area plan and place your area boundaries as shown below



Keep placing area boundaries until all of the cubicles have been created as areas and tagged for reference.



## Realize the value of utilizing Cloud-based Workplace Management Solutions to enable real-time analysis of facility spatial performance

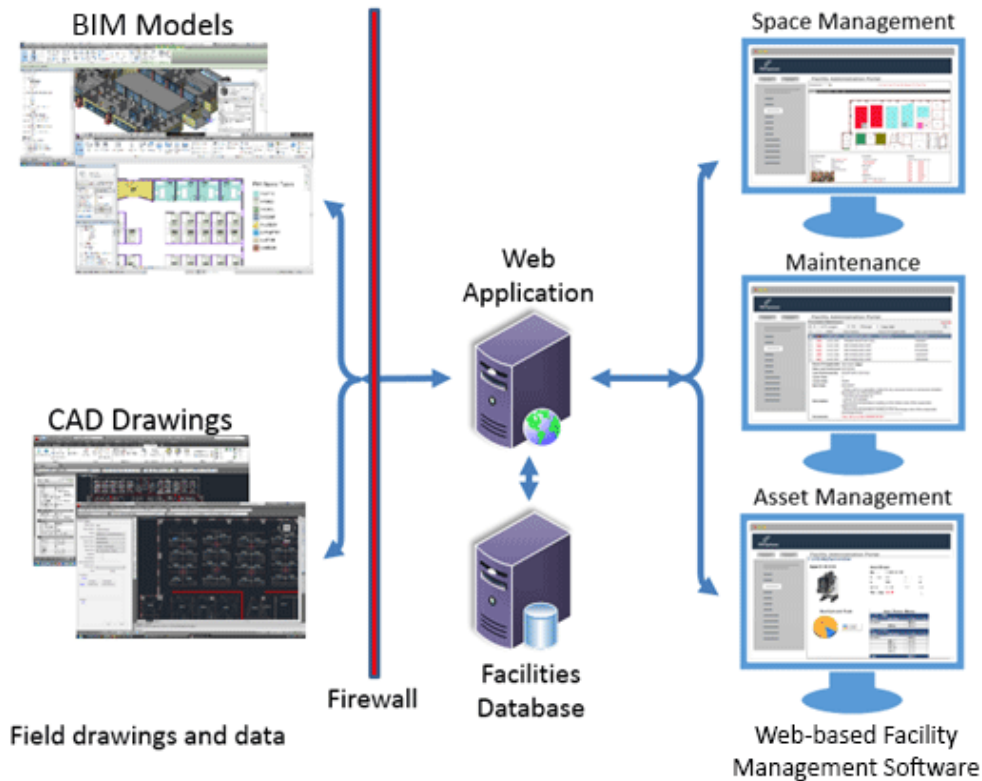
Organizations implementing facility management systems typically have these choices for installing the software:

- On-Premise, meaning the system is in the organization's private data center and behind the organization's firewall.
- Cloud-Based, meaning the system is in a data center provided by the software vendor and not behind the organization's firewall.

Although many organizations have traditionally preferred the on-premise option, this has changed dramatically in the past three years, with the trend moving strongly to Cloud-based deployment. This is being driven by better security for Cloud-based applications and significant reduction in IT management costs for Cloud-based systems. Without question though, some organizations will choose on-premise deployment due to IT preferences or the need for complete security control.

Cloud-based facility management systems with real-time bi-directional integration to a BIM model enables the subject matter experts, who are closest to the data and have been given an appropriate level of secure access, the ability to update information in the model quickly and easily. Most organizations depend on a number of specialists to plan, manage and operate their buildings. BIM skills in particular are often outsourced by owners and facility managers rather than staffed in-house. Cloud-based systems provide the IT environment that is needed to support essential collaboration.

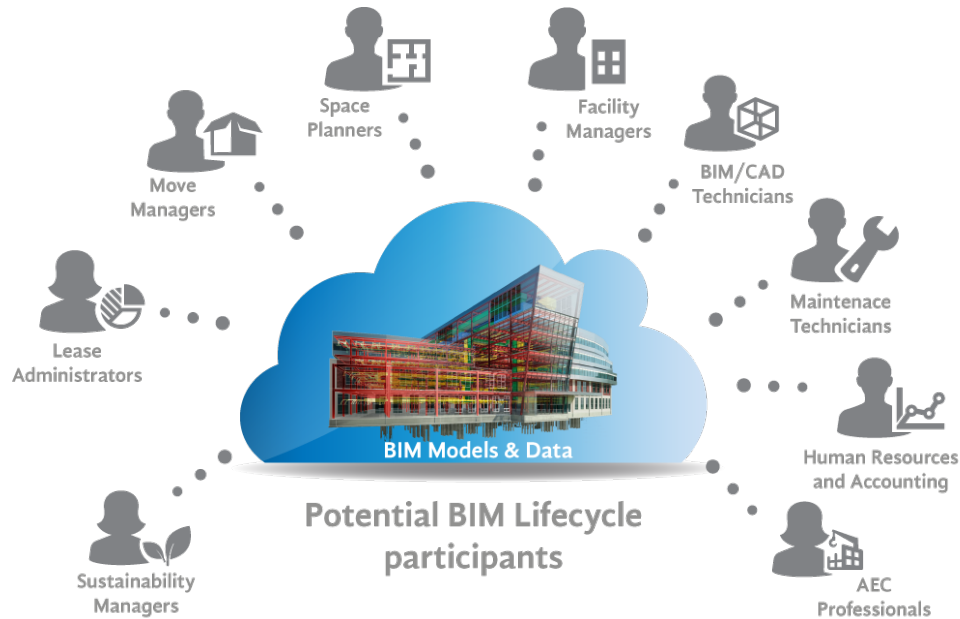
The Lifecycle BIM example diagram below shows what a basic BIM based lifecycle management solution can look like when coupled with a facility management system.



*Lifecycle BIM example*

The most basic example is a maintenance technician who spends his or her time in the field completing both preventive and corrective maintenance tasks. Their view of BIM data may be as limited as seeing asset details or maintenance information on a handheld device, such as a smart phone, and may not even interact with a 2D floor plan as they go about their daily maintenance tasks. They could also be performing additional tasks such as barcode scanning assets and logging their conditions through a limited data driven form. This type of very specific access is distributed broadly to staff who interact with facilities data every single day, anytime and anywhere. This allows them to quickly and easily access and update a BIM model, which is the key to high quality lifecycle maintenance of the model. As you can see in this sense there is no actual BIM modeling experience required for the majority of the Lifecycle BIM tasks required to maintain healthy models.

A facility management system that has a live bi-directional connection to the BIM model is the best way to ensure that a model continues to live on and provide value to building owners through the lifecycle of a building. A primary method for achieving this is by providing distributed secure access to AEC and facilities management professionals in a way that allows those specialists to provide the services needed to ensure the continued accuracy and security of the model.



*Collaboration enables Lifecycle BIM*

## **Find out how to take advantage of Business Intelligence Tools (BI) to enable the analysis of massive amounts of BIM data across an entire facilities and real-estate portfolio**

In this section we will perform a live demonstration of a Workplace Management system to show the value of business intelligence tools (BI) and how they enable us to perform analysis on a massive amount of spatial data that could come from potentially dozens if not hundreds of Revit models of a building owner's facility portfolio.