

Data Integrations for a Construction Project

Building an Interactive and Integrated Data Platform

Tomislav Zigo AIA, CM-BIM, LEED AP+C

Vice President of VDC

CLAYCO

Liang Gong PE, PMP, LEED AP+C

VDC Senior Data Manager

CLAYCO





About the Speaker

Tomislav Zigo

- Advocate of digital tech implementation as a researcher
- Experienced in:
 - The vanguard of BIM methodology implementation on large healthcare, institutional & industrial projects
 - Research work in the field of Building Performance Analysis
 - Optimization and use of mobile and immersive technology and mentorship positions
- Currently leads Clayco's VDC department and teaches at Washington University in St. Louis.



About the Speaker

Liang Gong

- Preconstruction/estimating and VDC for Clayco
- Experienced in:
 - Project management
 - BIM development and coordination
 - 3D detail production, 5D development & earned value analysis protocols
 - Data analysis standards
 - Digital production tools to solve problems
 - Bridging gap between data captured in the field and project aspirations
 - Data aggregation process
 - Being liaison between software manufacturers and internal development team
- Received Master of Engineering Management degree from Duke University and Bachelor in Civil Engineering degree from Tianjin University in China.

Barcode

PowerApps

Revit

P6

Assemble

API

Architects

BIM Track

M Language

Unifomat

Risks

DAX

Dynamo

Zones

Naviswork

Power BI

BIM 360 Glue
BIM 360 Field

Forecasting

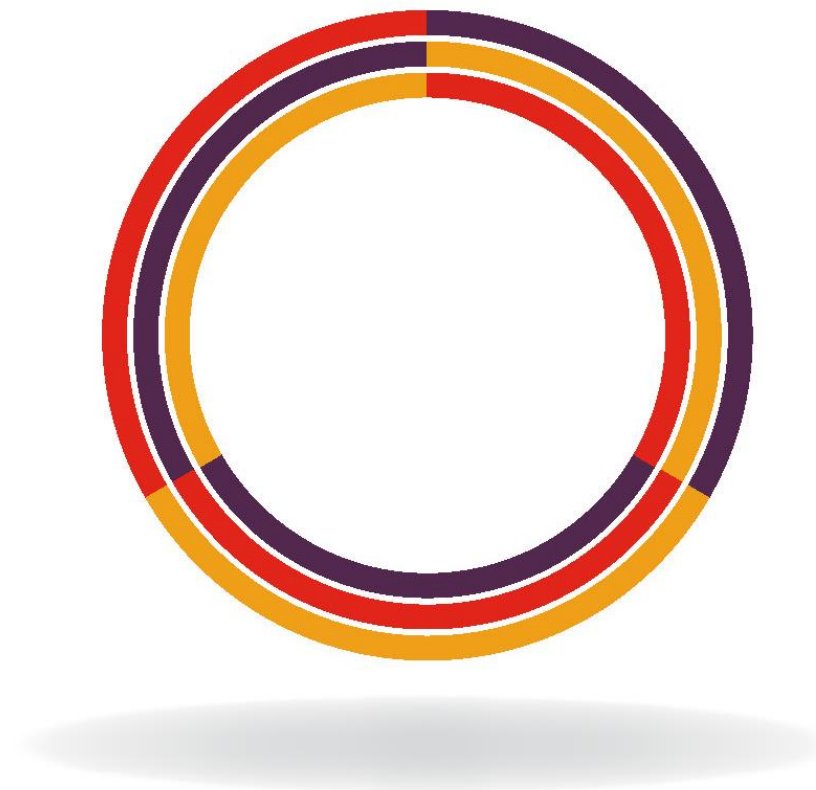
Python

SQL

Integrated Delivery

Develop | Design | Build

The integrated nature of our team allows us to communicate and challenge each other to drive better results for our clients.



CRG

develop

SITE SELECTION
DEVELOPMENT
FINANCING
ASSET MANAGEMENT

LJC

design

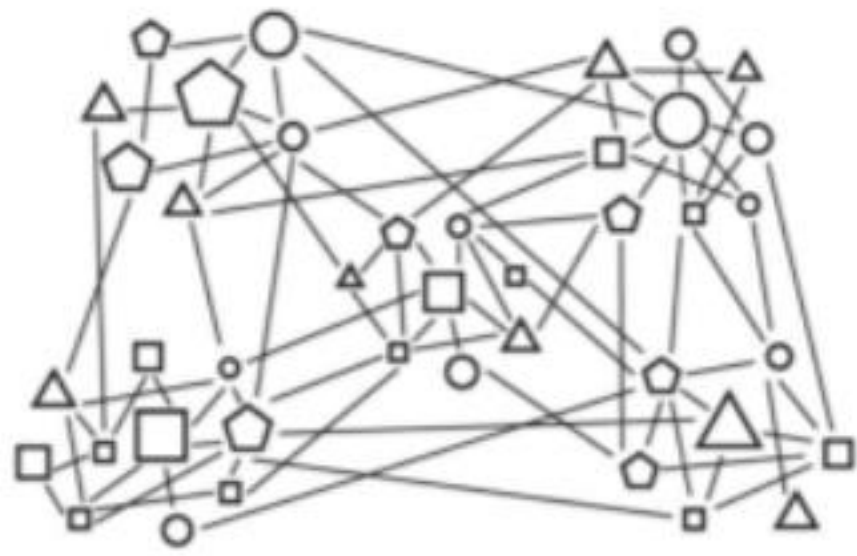
ADVANCE STRATEGIES
PLANNING
ARCHITECTURE
INTERIORS

CLAYCO

build

DESIGN-BUILD
CM@RISK
SELF-PERFORM
CULTURE OF SAFETY

The Clayco delivery model is based upon a collaborative team. Finance, planning, designers, engineers, programmers, builders and clients working transparently, sharing information and knowledge with the common commitment of exceeding the owner's expectations.



BIM Track Structure
BIM Track API Structure
BIM Track in Power BI
(M Language)
Disciplines (DAX)

Zones
Element ID
SQL
PowerApp

BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code

Assemble: Tracking Rooms Installation-Scanning Bar Code

P6 and Assemble Schedule Integrator

Model Mashups: Design Iterations and Design vs Construction

Power BI Data Connector

Installation Status Tracking

4 Levels
(Conditional
Formatting)

Front end: DAX
Back end: M Language
Python Scripts

2 Levels
(Binary)

Installed Or Not
Forecasting



To *think* as a **VDC** engineer



BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code



BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code



Question #1

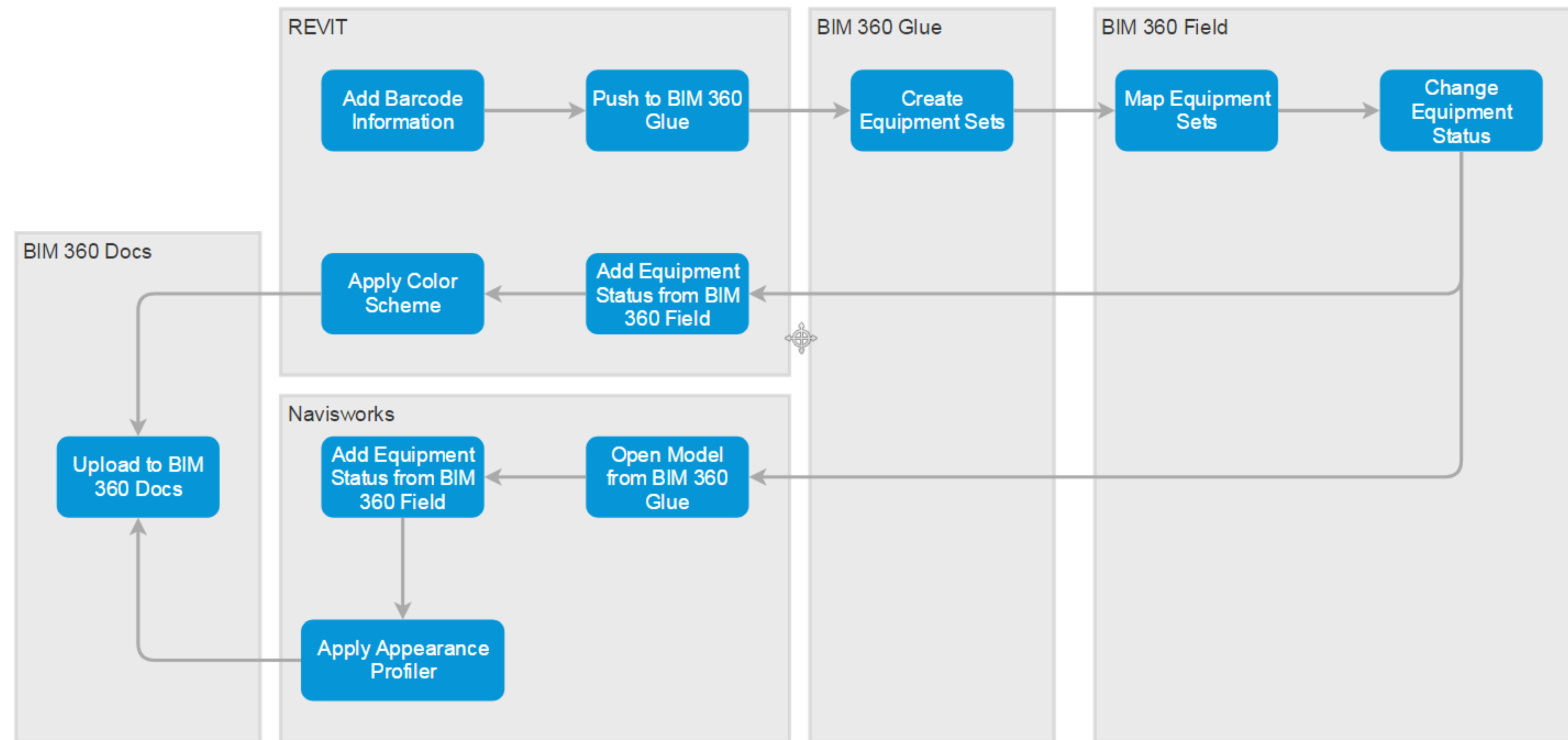
How to integrate
Barcodes into Revit?

Question #2

How to stand in center
of a room when using
“Show in Model”?
(Out of a surprise)

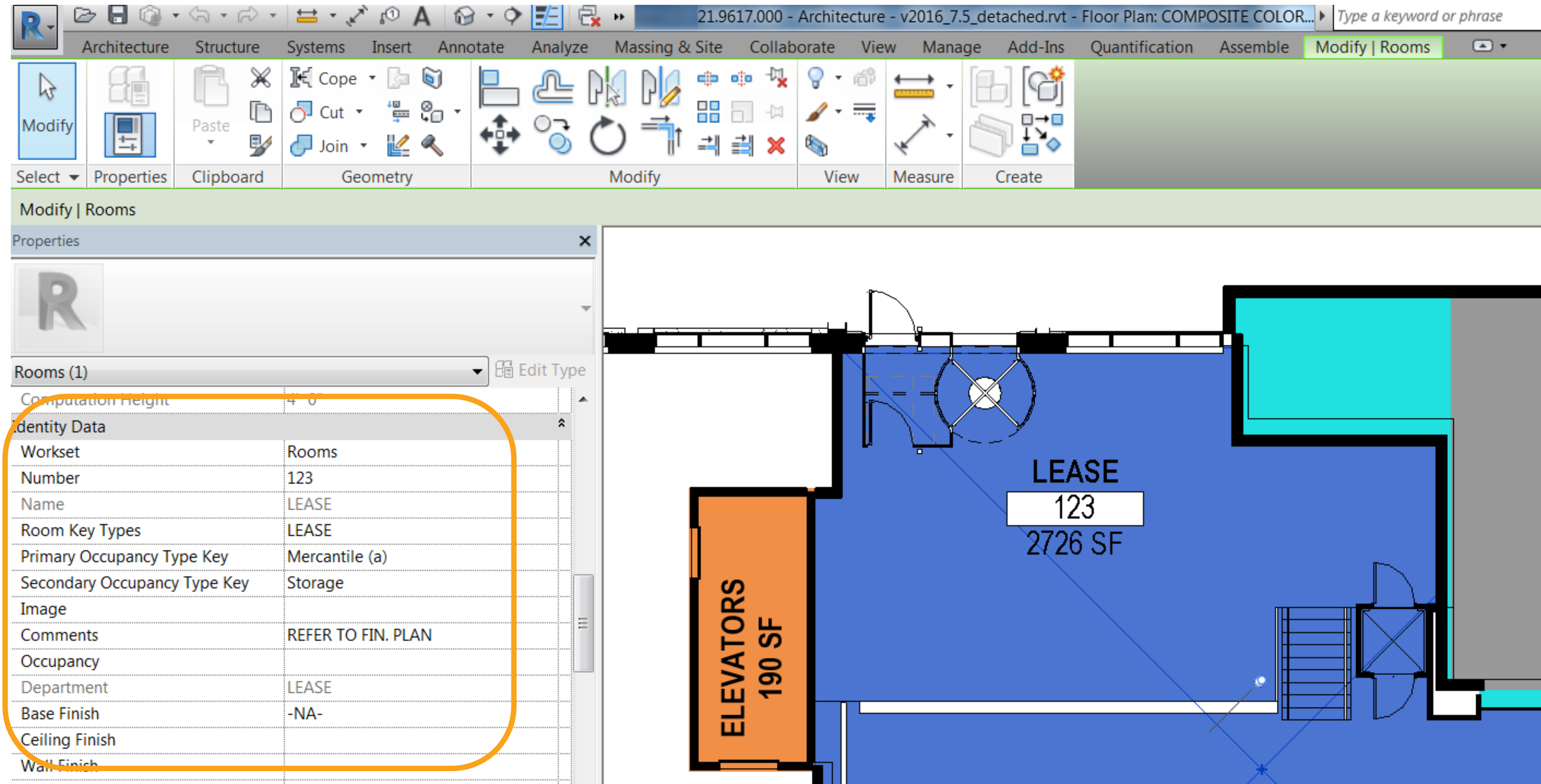
BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code

Question #1 How to integrate Barcodes into Revit?



BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code

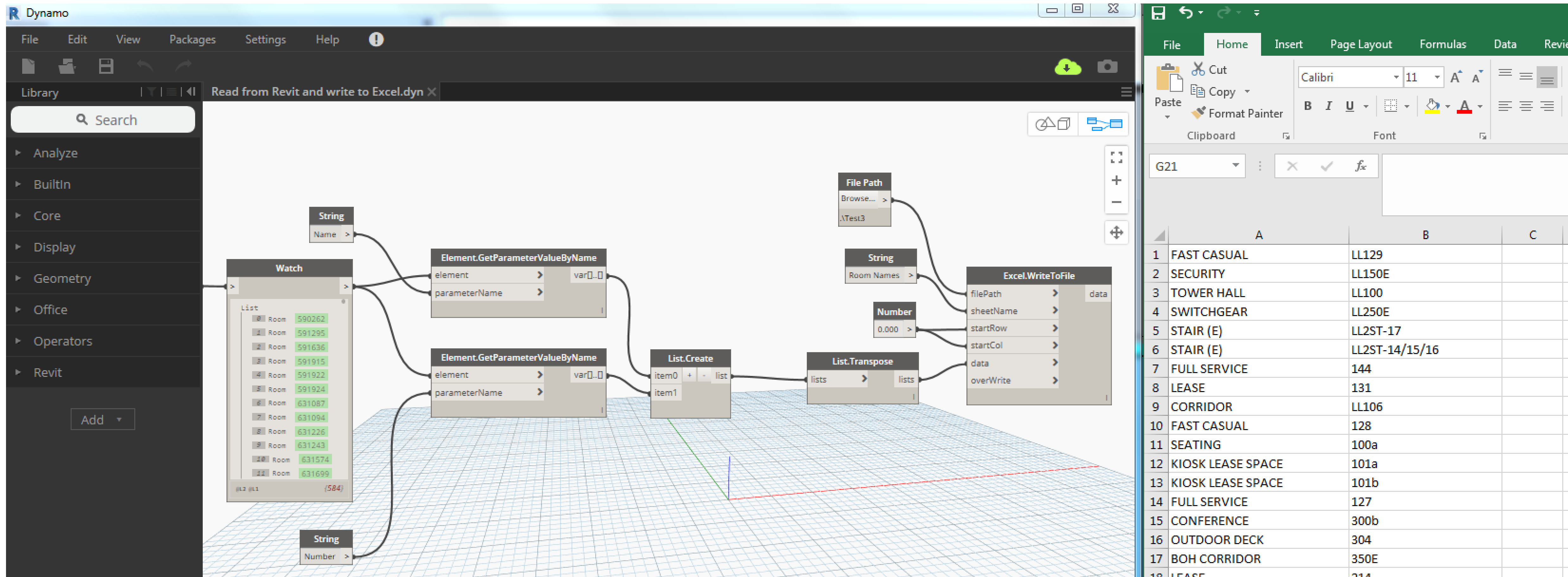
Question #1 How to integrate Barcodes into Revit?



No Barcode information

BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code

Read from Revit and write to Excel – To grasp all the room information



BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code

Read from Revit and write to Excel – To grasp all the room information

The image displays a workflow in the Dynamo software interface, which is used for automating data extraction from Revit and writing it to an Excel spreadsheet. The workflow is titled "Read from Revit and write to Excel.dyn".

Dynamo Workflow:

- A **String** node with the value "Name" is connected to the **Element.GetParameterValueByName** node.
- The **Element.GetParameterValueByName** node is connected to the **Watch** node.
- The **Watch** node is connected to the **String** node.
- The **String** node is connected to the **Element.GetParameterValueByName** node.
- The **Element.GetParameterValueByName** node is connected to the **List.Create** node.
- The **List.Create** node is connected to the **List.Transpose** node.
- The **List.Transpose** node is connected to the **Excel.WriteToFile** node.
- The **Excel.WriteToFile** node is connected to the **String** node.
- The **String** node is connected to the **Excel.WriteToFile** node.
- The **Excel.WriteToFile** node is connected to the **String** node.
- The **Excel.WriteToFile** node is connected to the **String** node.

Excel Spreadsheet:

The Excel spreadsheet shows the data extracted from Revit and written to the file. The data is organized into columns A, B, C, and D. The first column (A) contains room names, the second column (B) contains room numbers, and the third column (C) contains room codes. The fourth column (D) contains room codes.

	A	B	C	D
1	FAST CASUAL	LL129	1001	
2	SECURITY	LL150E	1002	
3	TOWER HALL	LL100	1003	
4	SWITCHGEAR	LL250E	1004	
5	STAIR (E)	LL2ST-17	1005	
6	STAIR (E)	LL2ST-14/15/16	1006	
7	FULL SERVICE	144	1007	
8	LEASE	131	1008	
9	CORRIDOR	LL106	1009	
10	FAST CASUAL	128	1010	
11	SEATING	100a	1011	
12	KIOSK LEASE SPACE	101a	1012	
13	KIOSK LEASE SPACE	101b	1013	
14	FULL SERVICE	127	1014	
15	CONFERENCE	300b	1015	
16	OUTDOOR DECK	304	1016	
17	BOH CORRIDOR	350E	1017	

BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code

Read from Excel and write to Revit – Write Barcodes back to Revit

The image displays a workflow for tracking room installations using BIM 360 Field. It consists of two main parts: a Dynamo workflow and an Excel spreadsheet.

Dynamo Workflow:

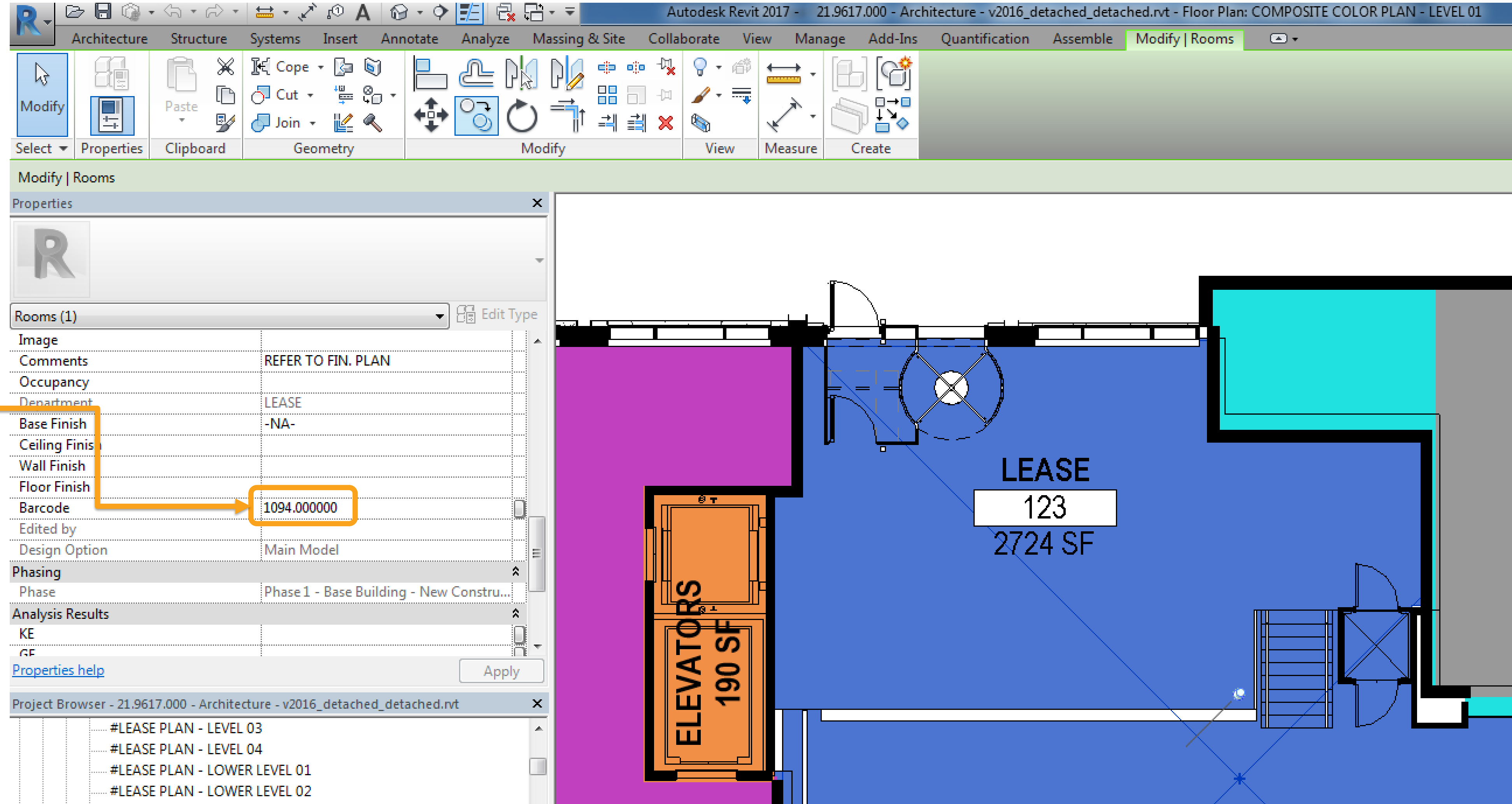
- Excel.ReadFromFile:** Reads data from an Excel file into a 'data' list.
- List.Transpose:** Transposes the data list into a list of lists.
- String:** Takes a 'Barcode' input and outputs a string.
- List.GetItemAtIndex:** Takes a 'list' and an 'index' (set to 2,000) to retrieve an item.
- String from Object:** Converts the retrieved item into a string.
- Element.SetParameterByName:** Sets the 'value' parameter of an 'element' to the string from the previous step.

Excel Spreadsheet:

	A	B	C	D
1	FAST CASUAL	LL129	1001	
2	SECURITY	LL150E	1002	
3	TOWER HALL	LL100	1003	
4	SWITCHGEAR	LL250E	1004	
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6	STAIR (E)	LL2ST-14/15/16	1006	
7	FULL SERVICE	144	1007	
8	LEASE	131	1008	
9	CORRIDOR	LL106	1009	
10	FAST CASUAL	128	1010	
11	SEATING	100a	1011	
12	KIOSK LEASE SPACE	101a	1012	
13	KIOSK LEASE SPACE	101b	1013	
14	FULL SERVICE	127	1014	
15	CONFERENCE	300b	1015	
16	OUTDOOR DECK	304	1016	
17	BOH CORRIDOR	350E	1017	
18	LEASE	314	1018	

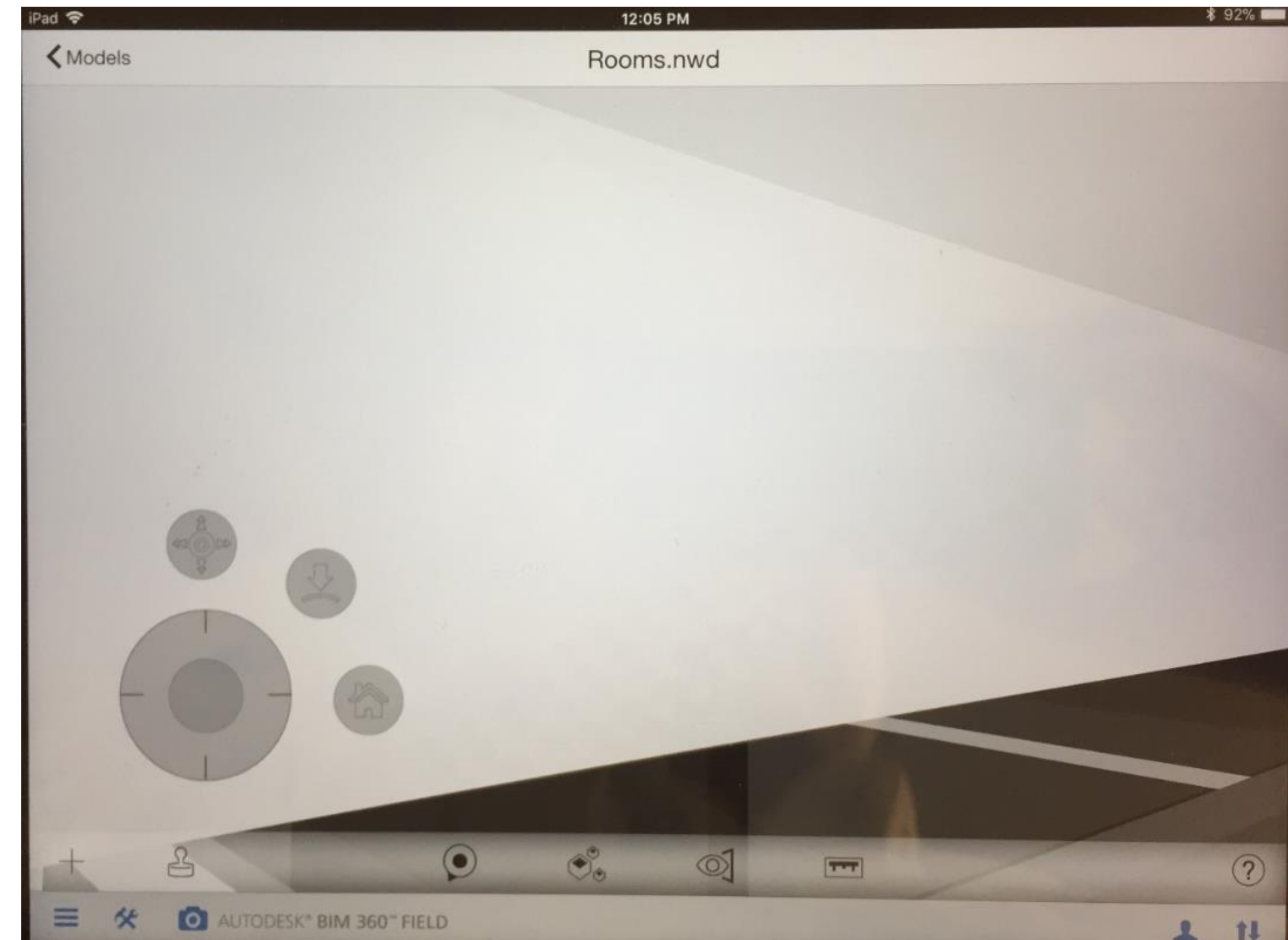
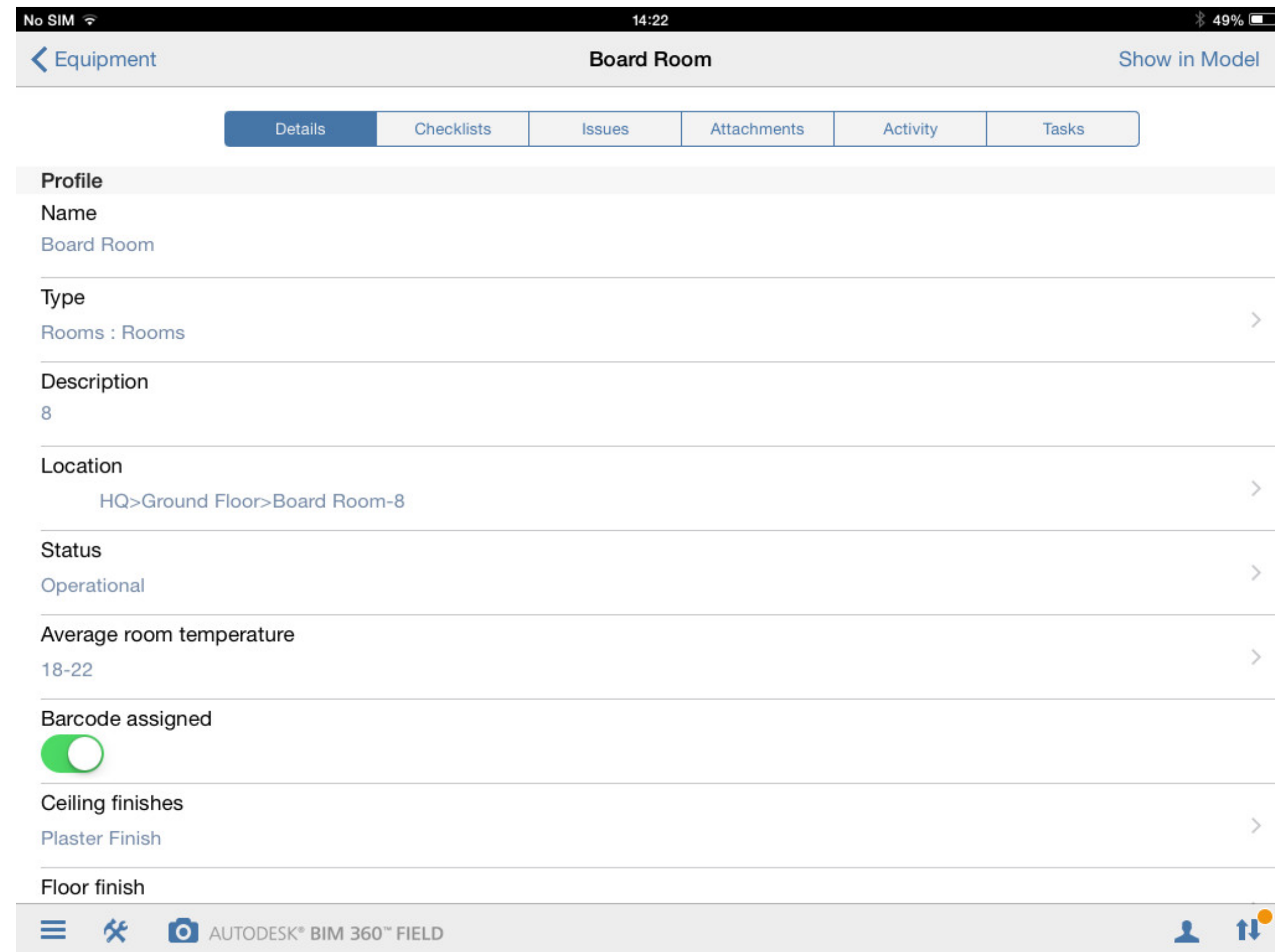
BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code

Read from Excel and write to Revit – Write Barcodes back to Revit



BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code

Question #2 How to stand in center of a room when using “Show in Model”?

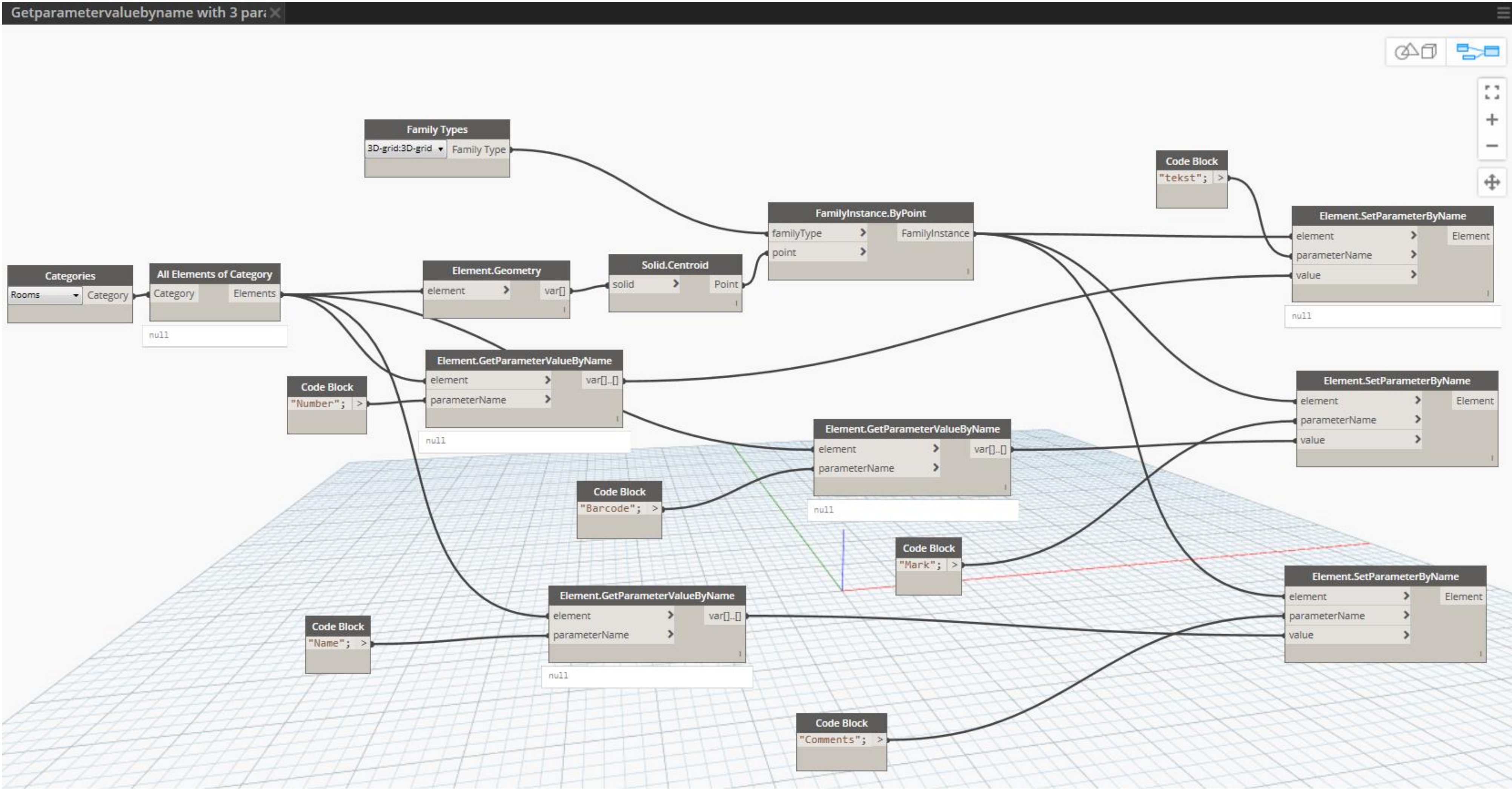
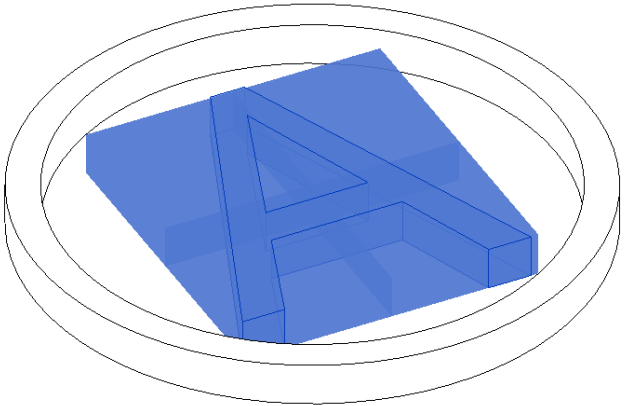


Where is the room?

The room is hidden by a wall or floor

Room name, room number and barcode are transferred to the associated 3D tag and then to 360 Field by expanding scripts.

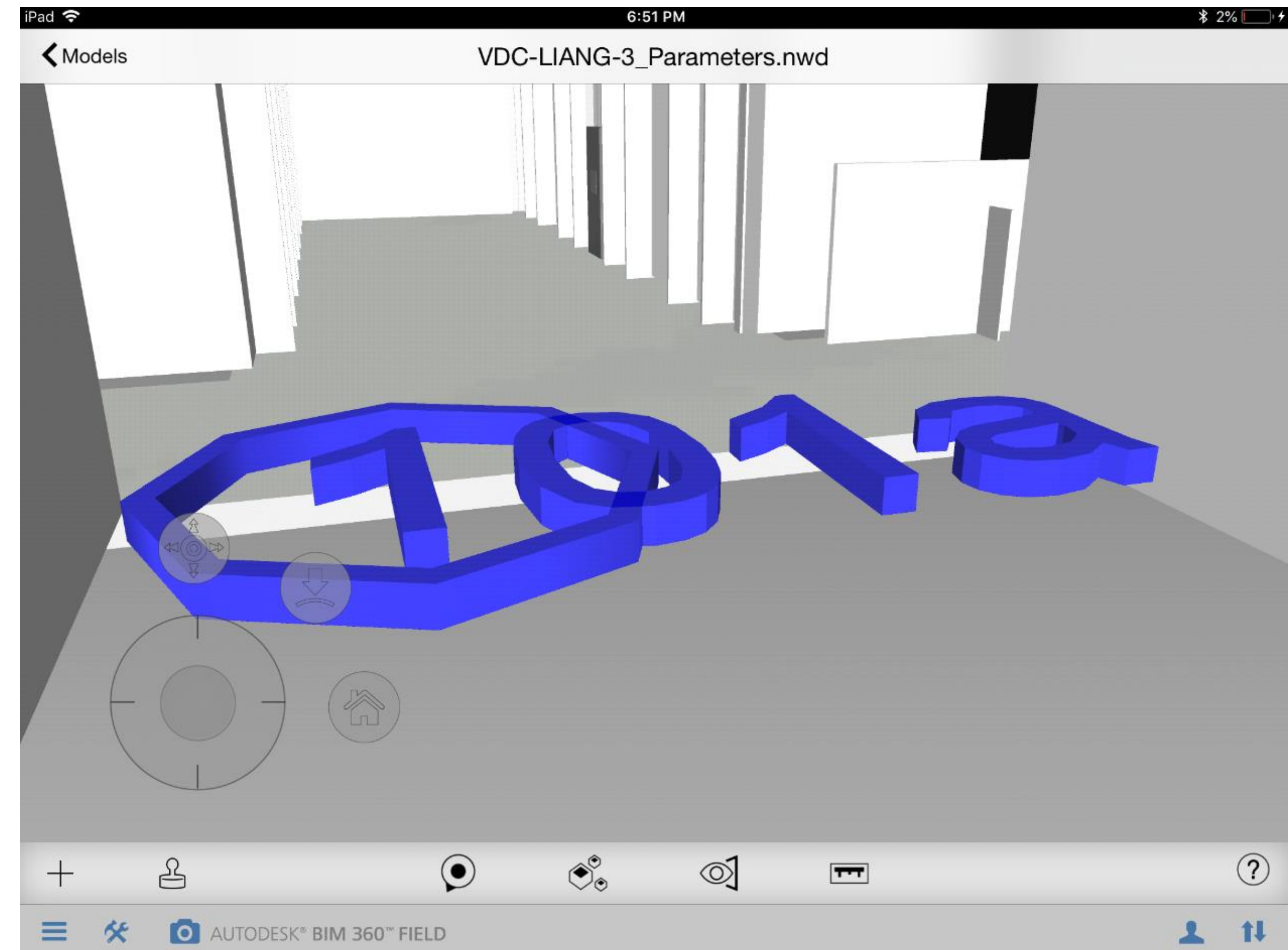
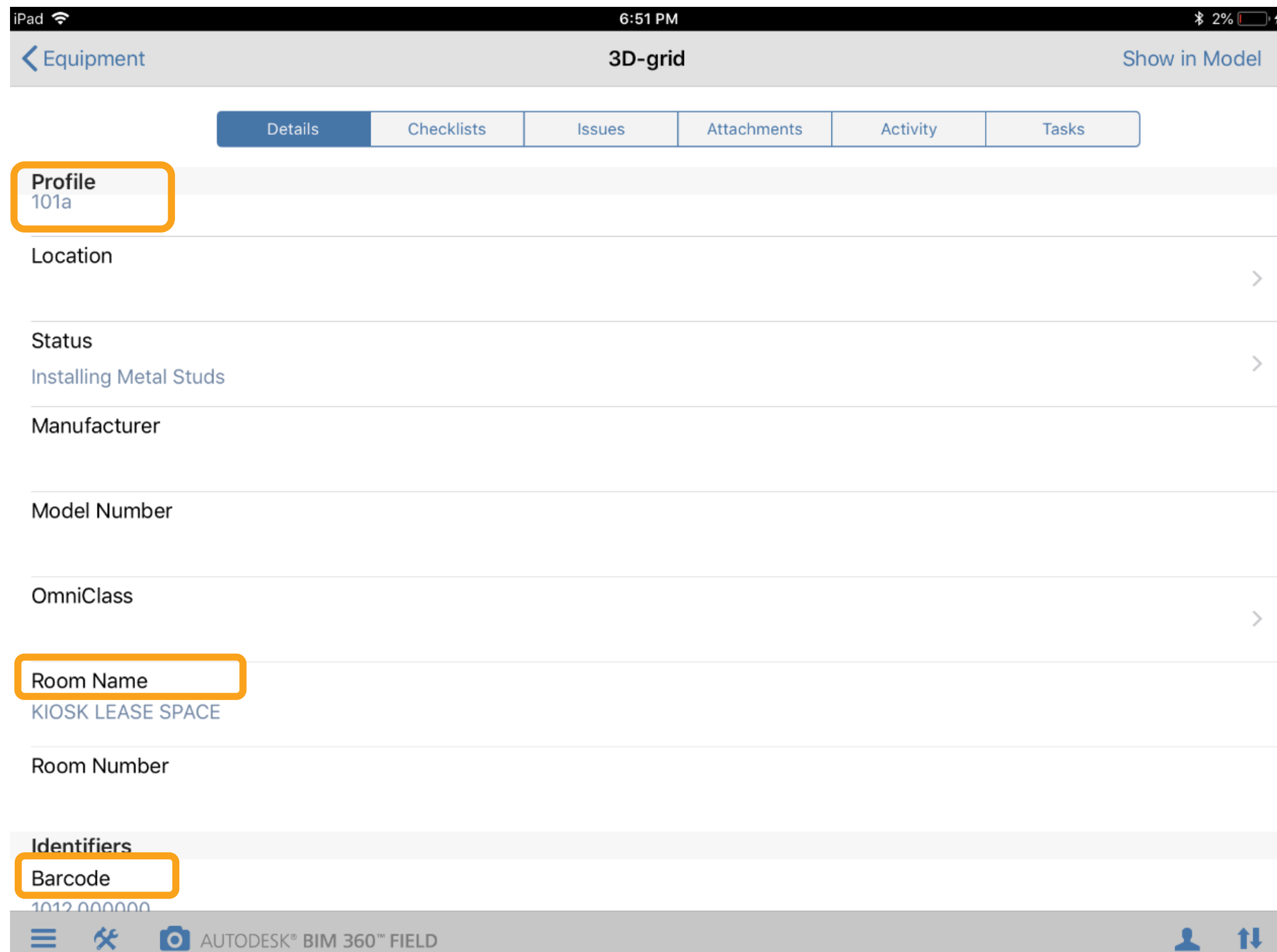
← Solution →



	AUTODESK® BIM 360™ FIELD	161374_Willis Tower Repositioning ▾ > Equipment																																																																																																																																																																																																																																																																																																																																																																	
 	<div> Search Reset </div> <div> Close </div> <div> Add </div> <div> Edit </div> <div> Delete </div> <div> Print </div> <div> More Actions ▾ </div>	<div>Filter</div> <div>All Equipment ▾</div> <div>Name</div> <div></div> <div>Type</div> <div>all ▾</div> <div>Description</div> <div></div> <div>Location</div> <div>Level 1 (L1) ✕ ▾</div> <div>Include sub-locations? </div> <div>Status</div> <div>all ▾</div> <div>Custom Properties</div> <div>Manufacturer</div> <div></div>	<table> <thead> <tr> <th><input type="checkbox"/></th><th>Name</th><th>Barcode</th><th>Type</th><th>Descr</th><th>Lo Pa</th><th>Status</th><th># Issues</th><th># Open Issues</th><th># Checklists</th><th># Op Chk</th><th>Ma</th><th>Model Number</th><th>Date Created</th><th>Cr</th><th>Room Number</th></tr> </thead> <tbody> <tr><td><input type="checkbox"/></td><td>ELEV MACHINE/CTRL LL320</td><td>1447.000000</td><td>Room</td><td></td><td></td><td>Completed</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td><td></td><td>09 Apr 2018 5:32 PM</td><td></td><td>LL320</td></tr> <tr><td><input type="checkbox"/></td><td>PLANTED TERRACE 119G</td><td>1530.000000</td><td>Room</td><td></td><td></td><td>Delivered</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td><td></td><td>09 Apr 2018 6:00 PM</td><td></td><td>119G</td></tr> <tr><td><input type="checkbox"/></td><td>VESTIBULE 132</td><td>1205.000000</td><td>Room</td><td></td><td></td><td>Delivered</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td><td></td><td>09 Apr 2018 9:09 PM</td><td></td><td>132</td></tr> <tr><td><input type="checkbox"/></td><td>BOH LL350E</td><td>1116.000000</td><td>Room</td><td></td><td></td><td>Completed</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td><td></td><td>09 Apr 2018 2:52 PM</td><td></td><td>LL350E</td></tr> <tr><td><input type="checkbox"/></td><td>TOWER HALL LL201</td><td>1184.000000</td><td>Room</td><td></td><td></td><td>Installing MEP</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td><td></td><td>09 Apr 2018 7:12 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<input type="checkbox"/>	STAIR (E) LL2ST-13	1369.000000	Room			Installing MEP	0	0	0	0			09 Apr 2018 5:01 PM		LL2ST-13																																																																																																																																																																																																																																																																																																																																																				
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<input type="checkbox"/>	IRR ROOM 148	1443.000000	Room			Delivered	0	0	0	0			09 Apr 2018 5:29 PM		148																																																																																																																																																																																																																																																																																																																																																				
<input type="checkbox"/>	VESTIBULE LL136	1408.000000	Room			Installing Drywall	0	0	0	0			09 Apr 2018 8:03 PM		LL136																																																																																																																																																																																																																																																																																																																																																				
<input type="checkbox"/>	FULL SERVICE 227	1024.000000	Room			Ordered	0	0	0	0			09 Apr 2018 10:11 PM		227																																																																																																																																																																																																																																																																																																																																																				
<input type="checkbox"/>	FAST CASUAL	1488.000000	Room			Delivered	0	0	0	0			09 Apr 2018 5:50 PM																																																																																																																																																																																																																																																																																																																																																						
<input type="checkbox"/>	JACKSON ENTRY 105	1454.000000	Room			Delivered	0	0	0	0			09 Apr 2018 9:27 PM		105																																																																																																																																																																																																																																																																																																																																																				
<input type="checkbox"/>	ELEC 115	1179.000000	Room			Delivered	0	0	0	0			09 Apr 2018 9:00 PM		115																																																																																																																																																																																																																																																																																																																																																				
<input type="checkbox"/>	ELEC LL350E	1308.000000	Room			Completed	0	0	0	0			09 Apr 2018 4:32 PM		LL350E																																																																																																																																																																																																																																																																																																																																																				
<input type="checkbox"/>	PLANTED TERRACE 119K	1534.000000	Room			Delivered	0	0	0	0			09 Apr 2018 6:05 PM		119K																																																																																																																																																																																																																																																																																																																																																				
<input type="checkbox"/>	S12-S14 S12-S14	1032.000000	Room			Completed	0	0	0	0			09 Apr 2018 2:49 PM		S12-S14																																																																																																																																																																																																																																																																																																																																																				
<input type="checkbox"/>	MECH LL205	1210.000000	Room			Installing MEP	0	0	0	0			09 Apr 2018 7:13 PM		LL205																																																																																																																																																																																																																																																																																																																																																				

BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code

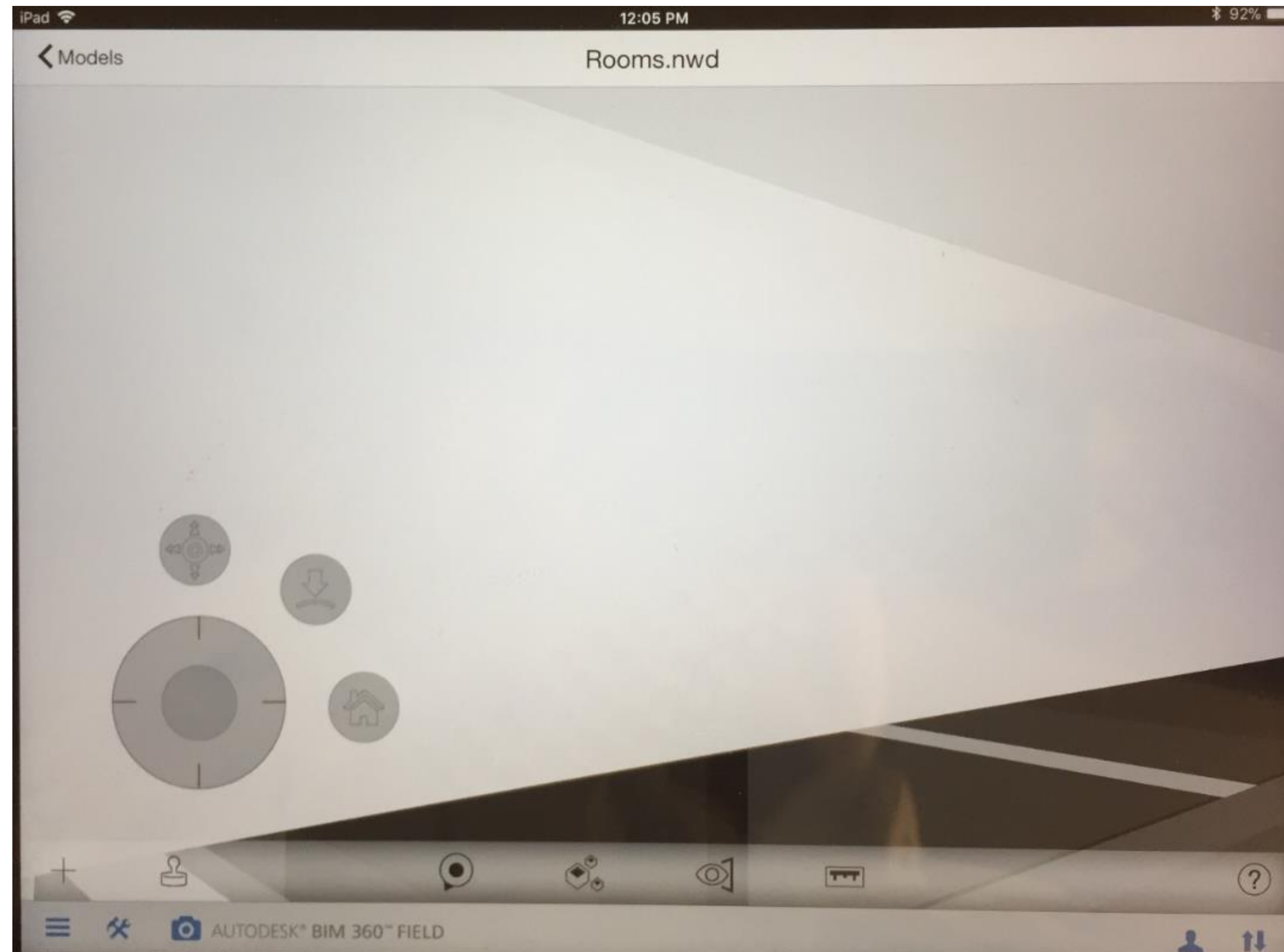
Question #2 How to stand in center of a room when using “Show in Model”?



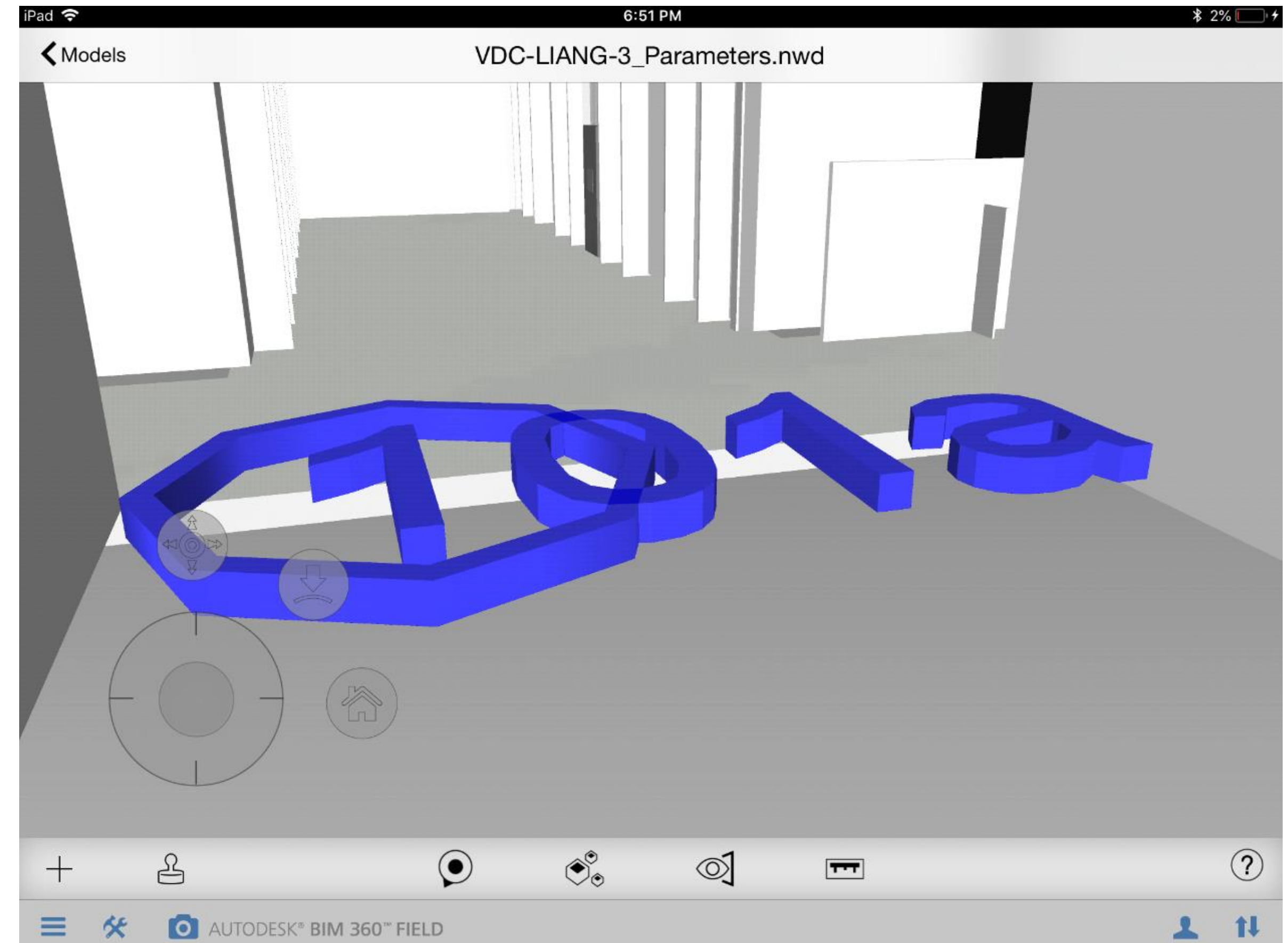
BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code

Question #2 How to stand in center of a room when using “Show in Model”?

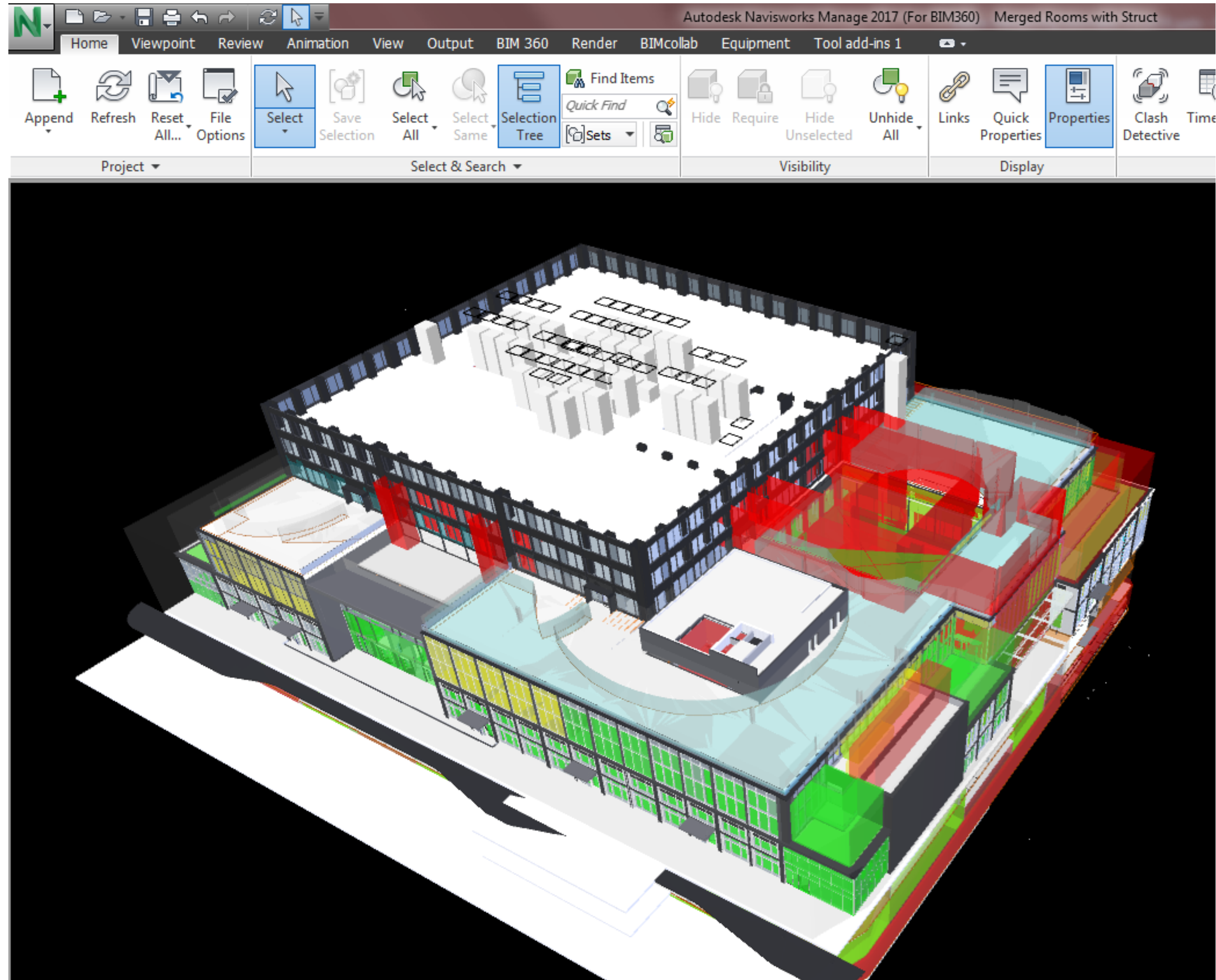
Before



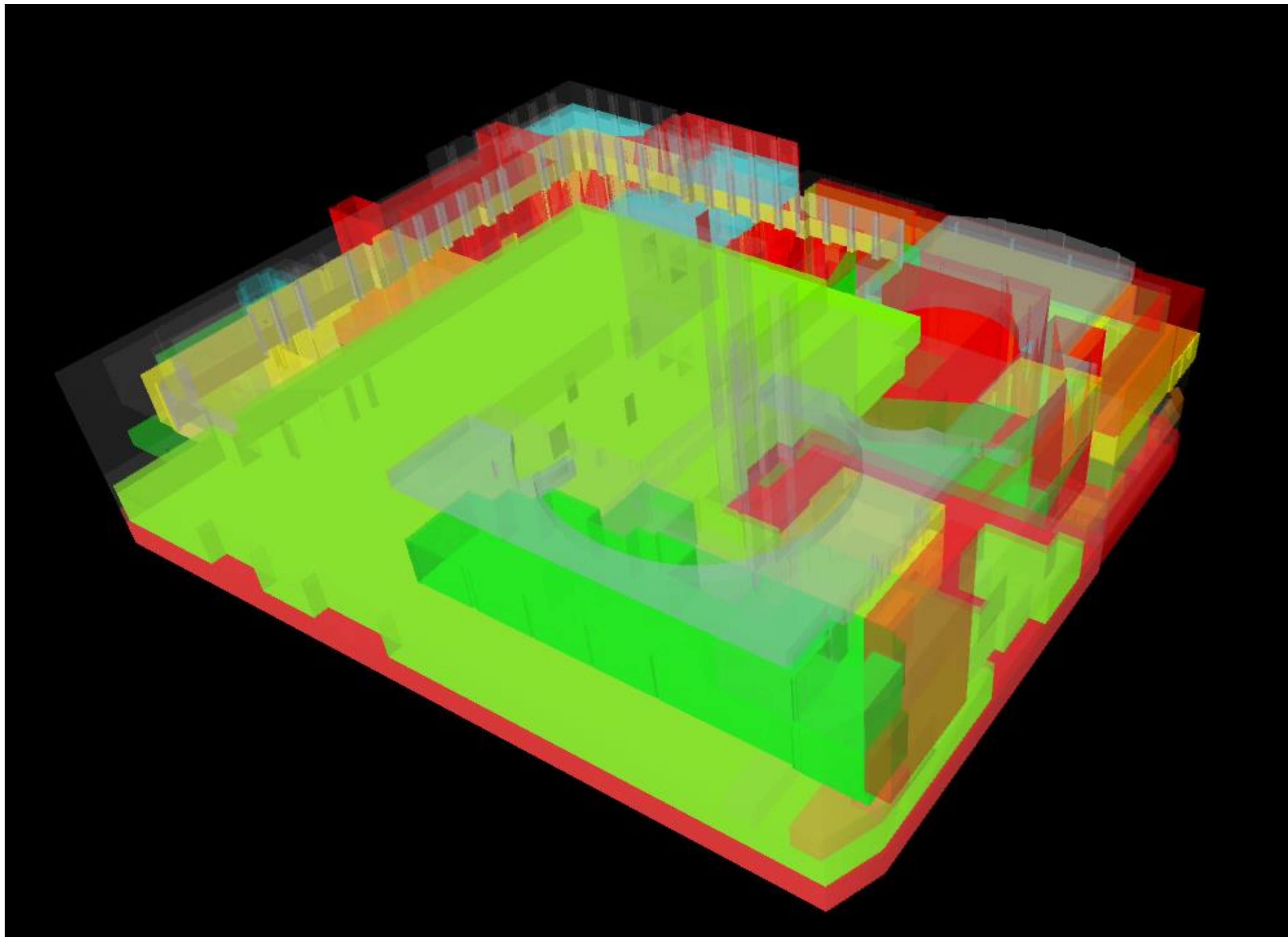
After










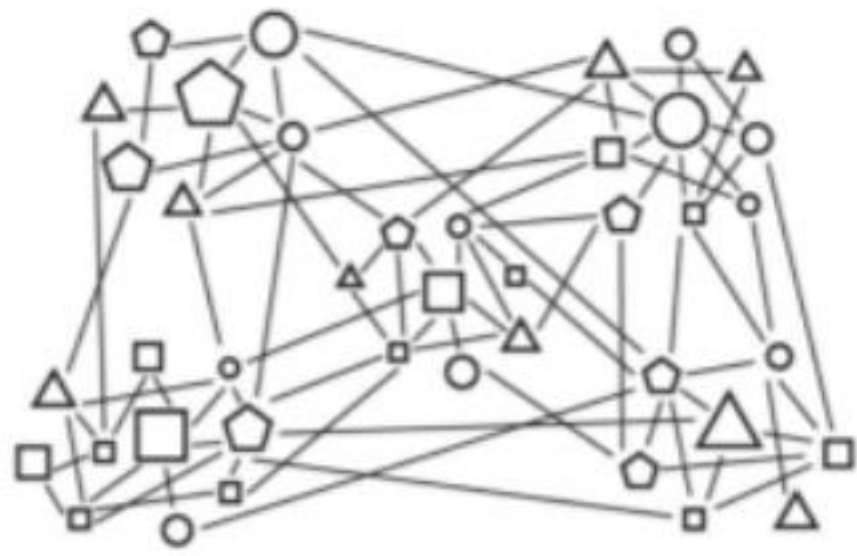
BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code



BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code



Selector		
BIM 360: Status equals "Planning"		80
BIM 360: Status equals "Ordered"		50
BIM 360: Status equals "Installing MEP"		50
BIM 360: Status equals "Installing Drywall"		50
BIM 360: Status equals "Completed"		50



BIM Track Structure
BIM Track API Structure
BIM Track in Power BI
(M Language)
Disciplines (DAX)

Zones

Element ID

SQL
PowerApp

BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code

Assemble: Tracking Rooms Installation-Scanning Bar Code

P6 and Assemble Schedule Integrator

Model Mashups: Design Iterations and Design vs Construction

Power BI Data Connector

Installation Status Tracking

4 Levels
(Conditional
Formatting)

Front end: DAX
Back end: M Language
Python Scripts

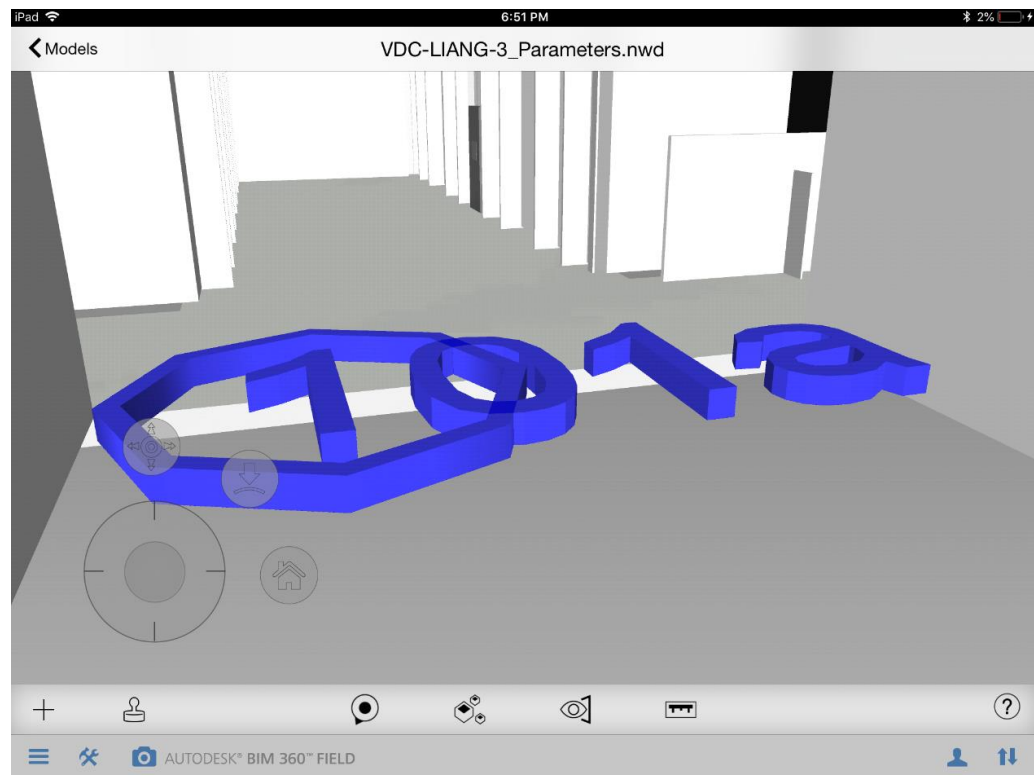
2 Levels
(Binary)

Installed Or Not
Forecasting

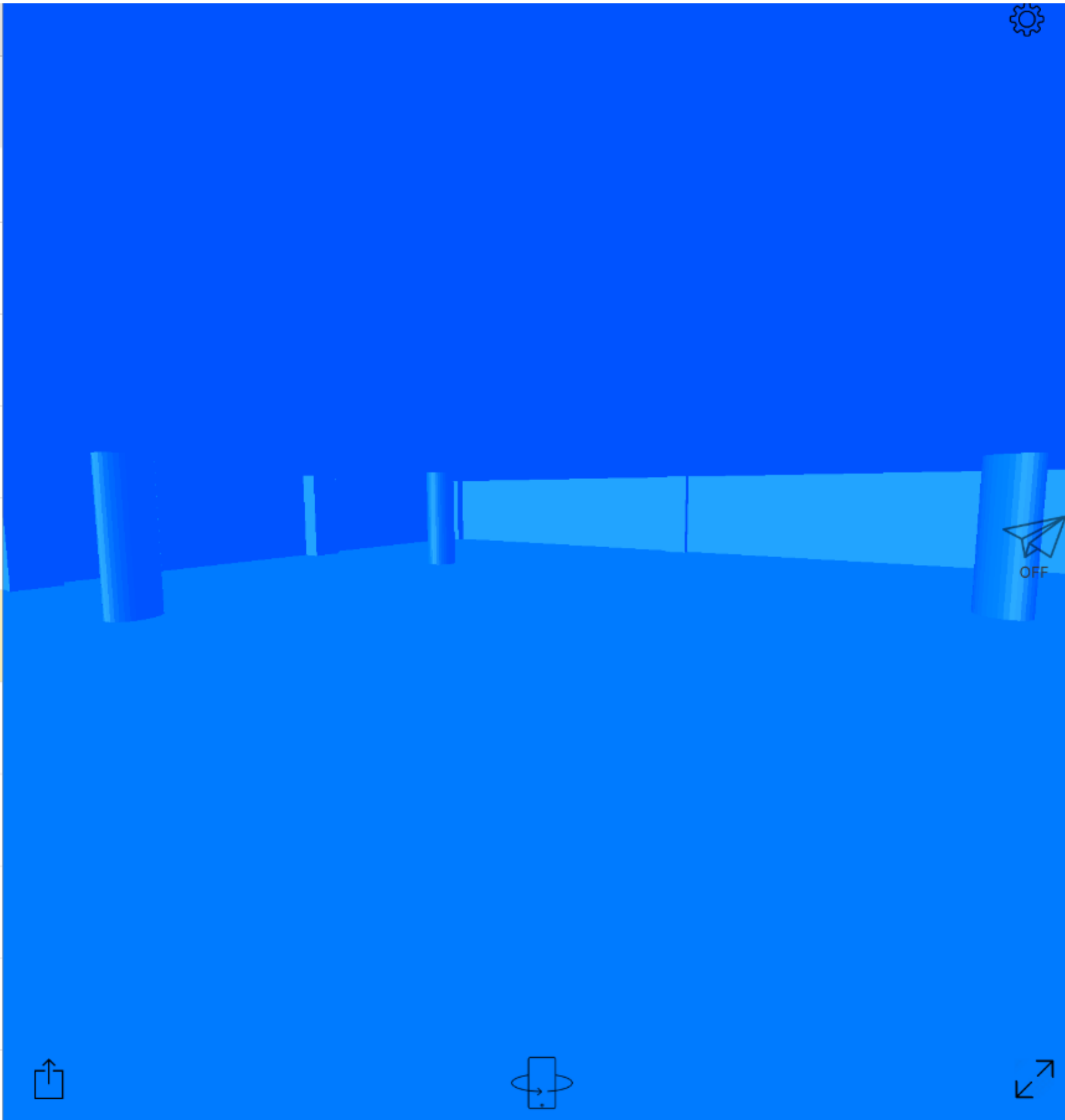


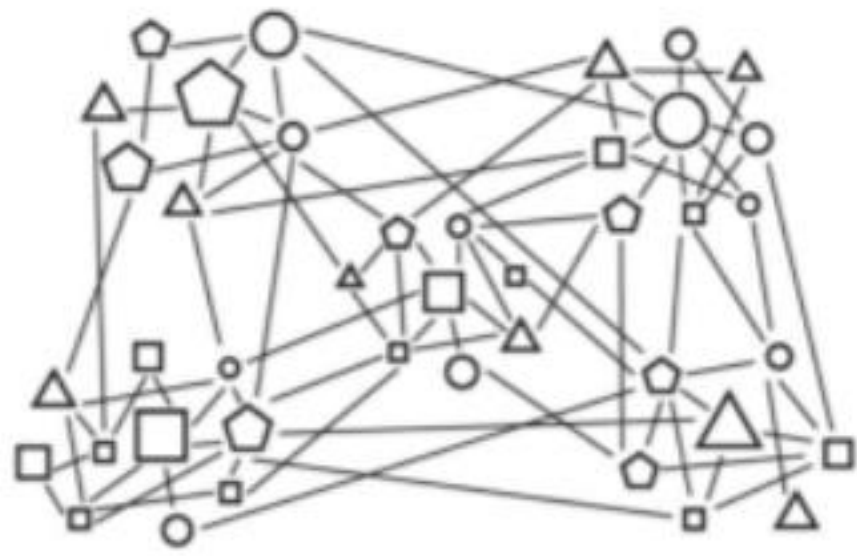
Tracking Rooms Installation-Scanning Bar Code

BIM 360 Field vs. Assemble



Inventory	
assemble	Objects Rooms
201 - PARKING 02	8,280.86 SF
202A - SWITCH GEAR	232.59 SF
202B - AUTOMATIC SWITCHGEAR	81.03 SF
203 - STAFF TOILET	47.19 SF
300 - VESTIBULE 03	97.72 SF
301 - PARKING 03	8,779.47 SF
400 - VESTIBULE 04	97.21 SF
401 - PARKING 04	8,843.57 SF
500 - OFFICE	8,885.09 SF
501 - JANITOR CLOSET	21.29 SF
502 - MEN	91.63 SF





BIM Track Structure

BIM Track API Structure

BIM Track in Power BI
(M Language)

Disciplines (DAX)

Zones

Element ID

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BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code

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Installation Status Tracking

4 Levels
(Conditional
Formatting)

Front end: DAX

Back end: M Language

Python Scripts

2 Levels
(Binary)

Installed Or Not

Forecasting


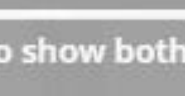
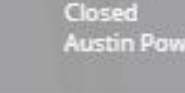






BIM Track Structure

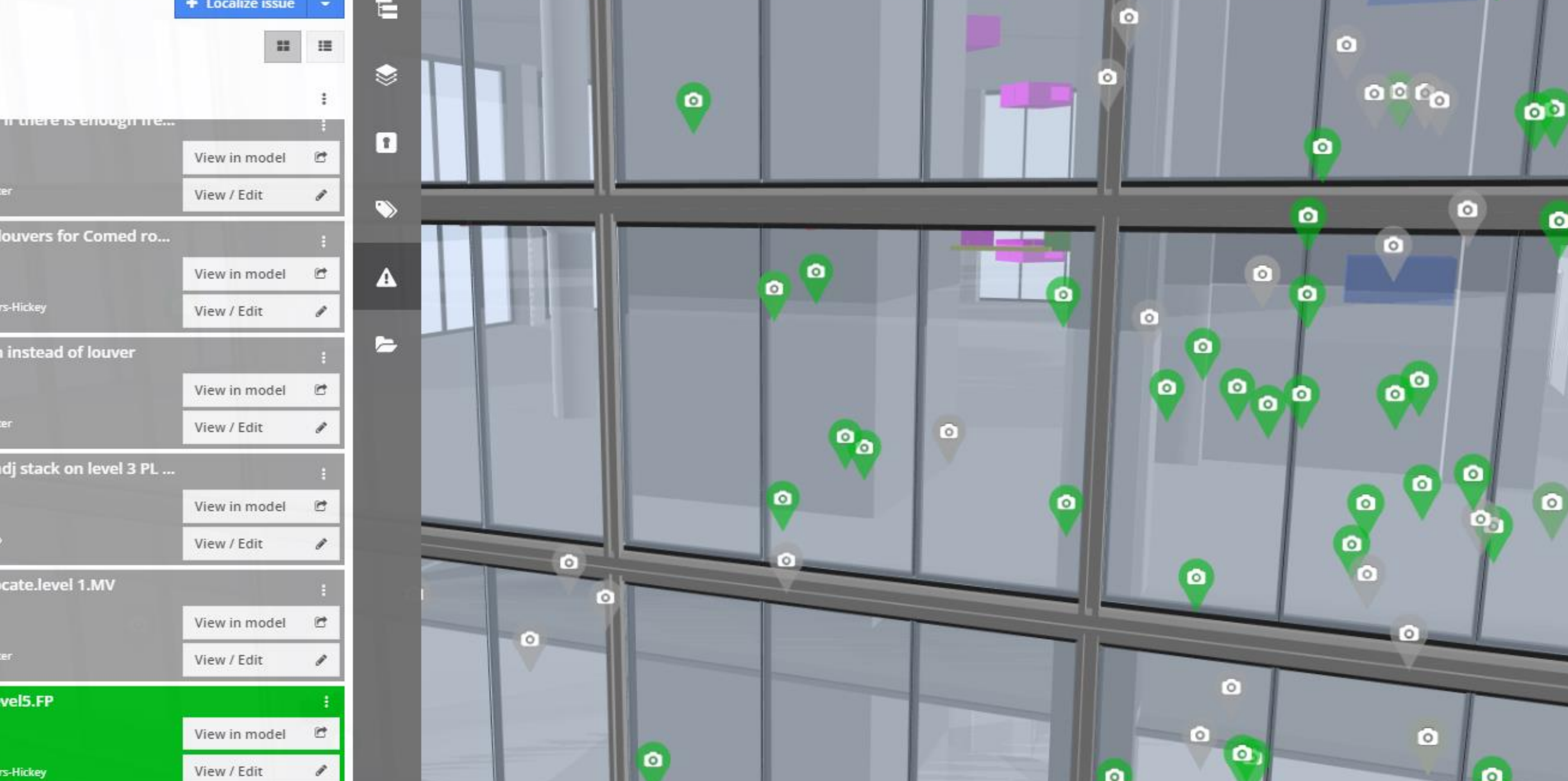
ISSUES

Filters
180 issues

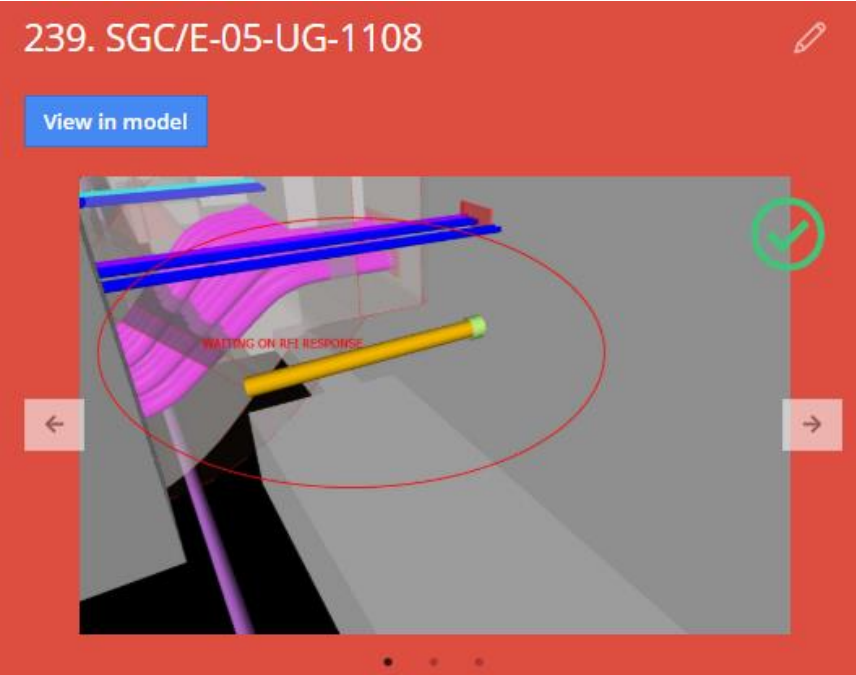
☐ Filter issue list based on clipping

	160. Structre to look into buss duct penetratio... Type: Priority: Status: Assigned to:	Remark: Medium Closed Tom Emerson	View in model View / Edit
	161. Stand pipe review.level5.FP Type: Priority: Status: Assigned to:	Remark: Medium Approved Austin Powers-Hickey	View in model View / Edit
	162. Intake louver to relocate.level 1.MV Type: Priority: Status: Assigned to:	Remark: Medium Closed Aaron Wachter	View in model View / Edit
	163. Move PLumbing to adj stack on level 3 PL ... Type: Priority: Status: Assigned to:	Remark: Medium Closed John Fabiano	View in model View / Edit
	164. AMS explores option instead of louver Type: Priority: Status: Assigned to:	Remark: Medium Closed Aaron Wachter	View in model View / Edit
	165. ARCH to show both louvers for Comed ro... Type: Priority: Status: Assigned to:	Remark: Medium Closed Austin Powers-Hickey	View in model View / Edit
	166. Mechanical to verify if there is enough fre... Type: Priority: Status: Assigned to:	Remark: Medium Closed Aaron Wachter	View in model View / Edit

Look
Orbit
Pan
Zoom
Select
Camera
Measure
Clipping Plane
Show
Clipping Box
Show / Hide
Reset View
Fullscreen
Opti...



BIM Track Structure



Description	IWW had to be rerouted to avoid clashes with LV under slab.
Status	Closed
Type	Clash
Priority	High
Discipline	Electrical Plumbing Site/Civil
Zone	MWH05-UG
Phase	[Not set]
Assigned to	monica.fine@apolloomech.com
Due date	12/10/2018
Issue group	
Confidentiality	
Notify	Kevin Laskowski (kevin.laskowski@veca.com) Lucas MacMillan (lucas.macmillan@gcinc.com) Logan Castle (logan.castle@gcinc.com) Monica Fine (monica.fine@apolloomech.com)
Author	kostialb@batesforum.com
Created	12/9/2018 9:40 PM
Last changed	9/27/2019 5:18 PM
Last changed by	kostialb@batesforum.com
Closing date	9/27/2019 5:18 PM

CommentAttachmentHistory

Type your comment here...

CommentAttachmentHistory

Type your comment here...

CommentAttachmentHistory

Type your comment here...

Browse...

FILES

vp0199.jpg

vp0198.jpg

vp0197.jpg

vp0196.jpg

12/13/2018 01:45 AM

Brett Kostial

kostialb@batesforum.com

Approval pending RFI#209 response.

Type your comment here...

9/27/2019

Brett Kostial updated issue

kostialb@batesforum.com

Show details

12/13/2018

Brett Kostial added a comment

kostialb@batesforum.com

12/13/2018

Brett Kostial archived comment

kostialb@batesforum.com

Show details

12/13/2018

Brett Kostial added a comment

kostialb@batesforum.com

12/11/2018

Brett Kostial updated issue

kostialb@batesforum.com

Show details

12/11/2018

Brett Kostial updated issue

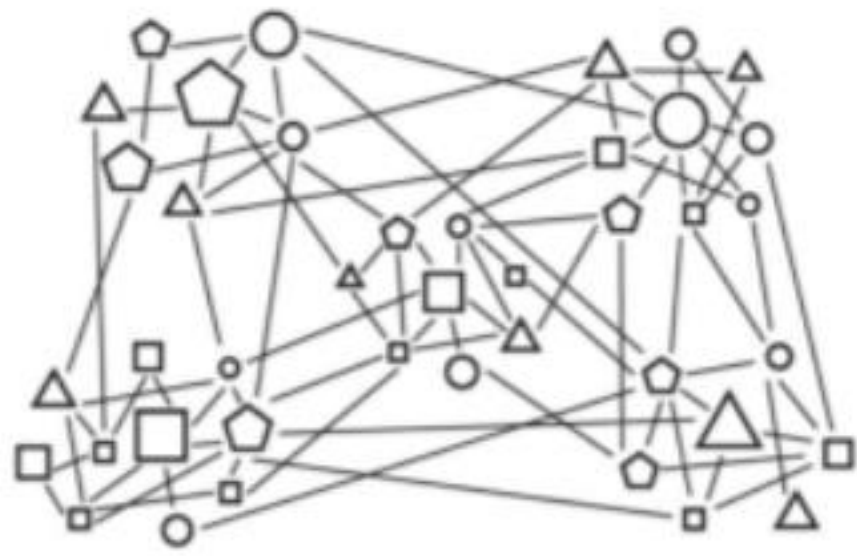
kostialb@batesforum.com

Show details

12/11/2018

Brett Kostial added a comment

kostialb@batesforum.com



BIM Track Structure
BIM Track API Structure

BIM Track in Power BI
(M Language)

Disciplines (DAX)

Zones

Element ID

SQL
PowerApp

BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code

Assemble: Tracking Rooms Installation-Scanning Bar Code

P6 and Assemble Schedule Integrator

Model Mashups: Design Iterations and Design vs Construction

Power BI Data Connector

Installation Status Tracking

4 Levels
(Conditional
Formatting)


Front end: DAX
Back end: M Language
Python Scripts

2 Levels
(Binary)

Installed Or Not
Forecasting



BIM Track API Structure



https://api.bimtrackapp.co/docs/v2

api_key

Explore

BIM Track API v2.0

BIM Track API

Hub

Show/Hide | List Operations | Expand Operations

Issue

Show/Hide | List Operations | Expand Operations

Project

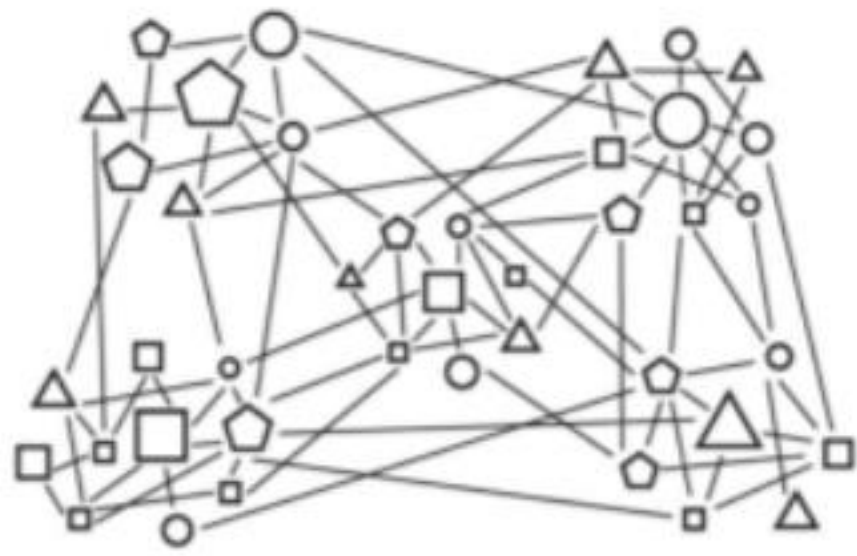
Show/Hide | List Operations | Expand Operations

Project Attributes

Show/Hide | List Operations | Expand Operations

[BASE URL: , API VERSION: v2]

Issue		Show/Hide List Operations Expand Operations
GET	/v2/hubs/{hubId}/projects/{projectId}/issues/{issueId}	Get issue
PATCH	/v2/hubs/{hubId}/projects/{projectId}/issues/{issueId}	Archive issue
PUT	/v2/hubs/{hubId}/projects/{projectId}/issues/{issueId}	Update issue
GET	/v2/hubs/{hubId}/projects/{projectId}/issues	Get issues
PATCH	/v2/hubs/{hubId}/projects/{projectId}/issues	Multi edit issues.
POST	/v2/hubs/{hubId}/projects/{projectId}/issues	Create issue
GET	/v2/hubs/{hubId}/projects/{projectId}/archivedissues/{issueId}	Get archived issue
GET	/v2/hubs/{hubId}/projects/{projectId}/archivedissues	Get archived issues
DELETE	/v2/hubs/{hubId}/projects/{projectId}/archivedissues/{archivedIssueId}	Delete archived issue
PATCH	/v2/hubs/{hubId}/projects/{projectId}/archivedissues/{archivedIssueId}	Restore issue
GET	/v2/hubs/{hubId}/projects/{projectId}/issues/{issueId}/attachments	Get issue attachments list
POST	/v2/hubs/{hubId}/projects/{projectId}/issues/{issueId}/attachments	Create issue attachment
DELETE	/v2/hubs/{hubId}/projects/{projectId}/issues/{issueId}/attachments/{attachmentId}	Delete issue attachment
GET	/v2/hubs/{hubId}/projects/{projectId}/issues/{issueId}/comments	Get issue comments



BIM Track Structure
BIM Track API Structure
**BIM Track in Power BI
(M Language)**
Disciplines (DAX)

Zones

Element ID
SQL
PowerApp

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Installation Status Tracking

4 Levels
(Conditional
Formatting)

Front end: DAX
Back end: M Language
Python Scripts

2 Levels
(Binary)

Installed Or Not
Forecasting



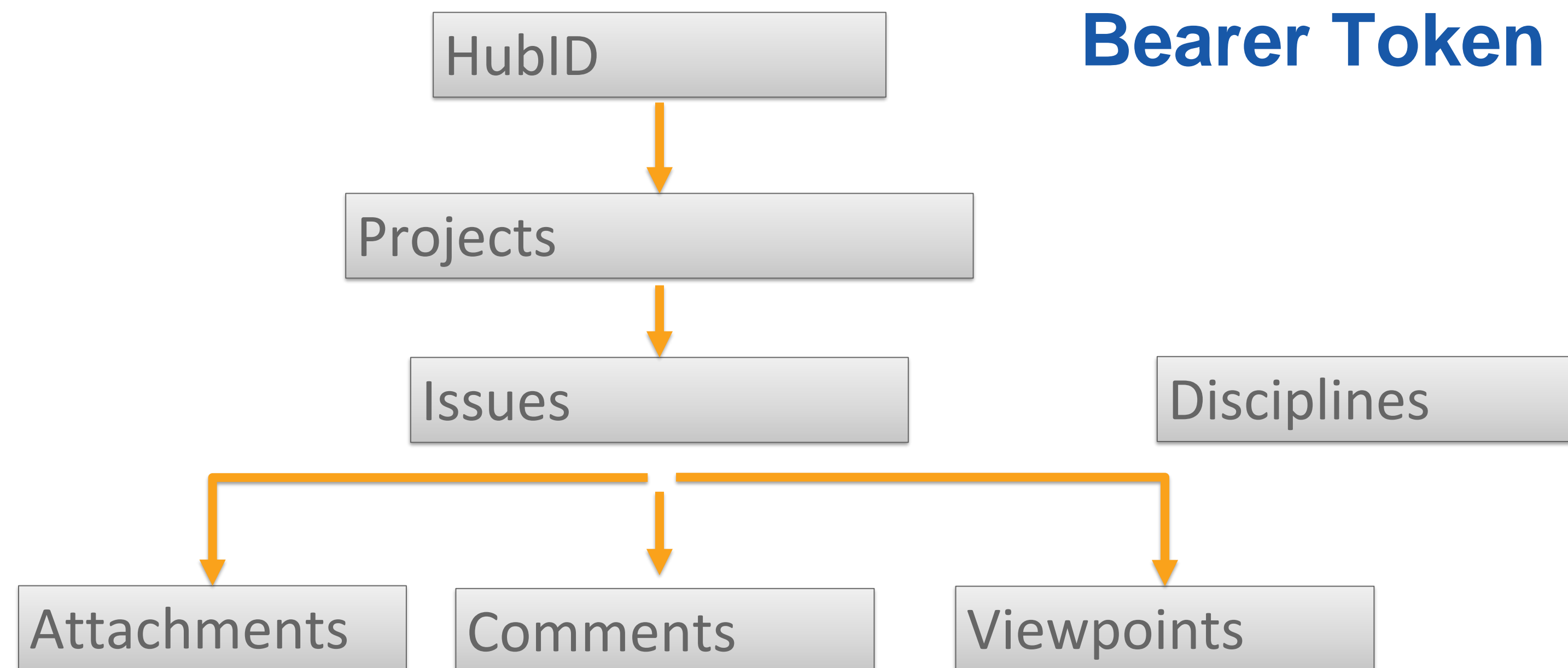
BIM Track API Structure

Pagination

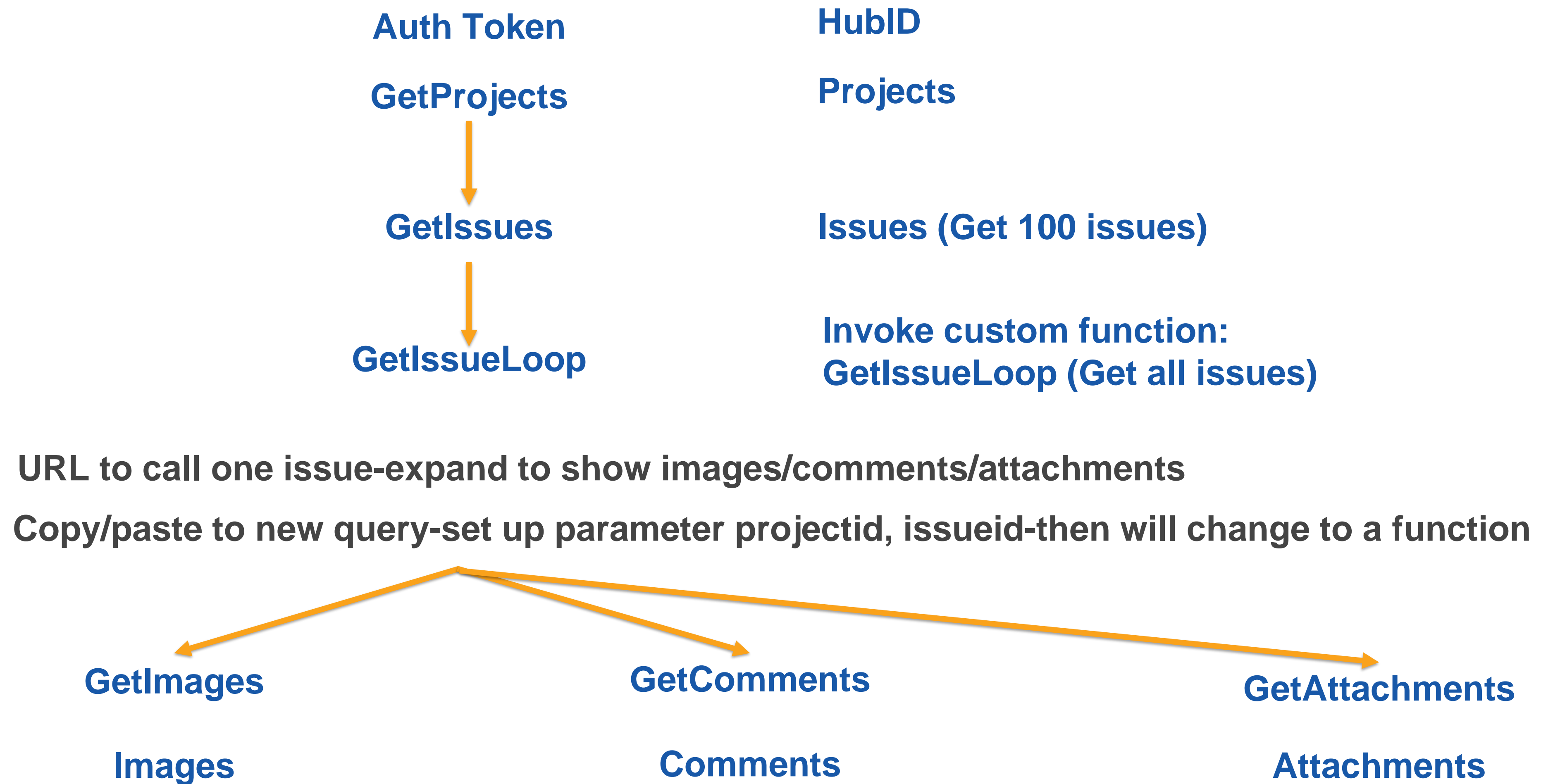
each [Result = try GetIssues([startnumber]+100, projectid) otherwise null, startnumber = [startnumber]+100]

Queries [15]

- Auth Token [1]
 - AuthToken (efa535c998089572)
- Functions [6]
 - GetProjects
 - GetImages
 - GetIssues
 - GetIssueLoop
 - GetComments
 - GetAttachments
- Other Queries [8]
 - HubID
 - Projects
 - Issues
 - Images
 - Disciplines
 - LastRefresh
 - Comments
 - Attachments



BIM Track in Power BI



BIM Track in Power BI

M Language: PowerQuery

```
#"Invoked Custom Function2" = Table.AddColumn(#"Sorted Rows", "ViewPoints", each GetImages([ProjectID], [IssueID]))
```

The screenshot displays the Power BI Advanced Editor window. The main area shows the M code for a query named 'Images'. The code starts with a 'let' statement and includes several steps: 'Source' (a JSON document from a BIM Track API), 'Converted to Table', 'Expanded Column1', 'Renamed Columns', 'Removed Columns', 'Invoked Custom Function' (adding 'ProjectID'), 'Expanded Projects', 'Removed Columns1', 'Renamed Columns1', 'Changed Type', 'Invoked Custom Function1' (adding 'Issues'), 'Removed Errors', 'Expanded Issues', 'Filtered Rows', 'Renamed Columns2', 'Changed Type1', 'Removed Columns2', 'Sorted Rows', 'Invoked Custom Function2' (adding 'ViewPoints'), 'Removed Errors1', and 'Expanded ViewPoints'. The 'in' clause at the end returns '#"Expanded ViewPoints"'. On the right, the 'APPLIED STEPS' pane lists these steps in order. An orange double-headed arrow points from the 'Invoked Custom Function2' step in the code to its corresponding entry in the 'APPLIED STEPS' list.

Advanced Editor

Images

Display Options ?

```
let
    Source = Json.Document(Web.Contents("https://api.bimtrackapp.co/v2/hubs/"),
    #"Converted to Table" = Table.FromList(Source, Splitter.SplitByNothing(),
    #"Expanded Column1" = Table.ExpandRecordColumn(#"Converted to Table", "Columns",
    #"Renamed Columns" = Table.RenameColumns(#"Expanded Column1", {"Column1.Id", "Id", "Column1.Name", "Name", "Column1.Number", "Number", "Column1.Description", "Description", "Column1.ProjectID", "ProjectID", "Column1.IssueID", "IssueID", "Column1.ViewPoints", "ViewPoints"},
    #"Removed Columns" = Table.RemoveColumns(#"Renamed Columns", {"Column1.Name", "Column1.Number", "Column1.Description", "Column1.ProjectID", "Column1.IssueID", "Column1.ViewPoints"},
    #"Invoked Custom Function" = Table.AddColumn(#"Removed Columns", "ProjectID", each [ProjectID]),
    #"Expanded Projects" = Table.ExpandTableColumn(#"Invoked Custom Function", "ProjectID", {"ProjectID", "IssueID", "ViewPoints"},
    #"Removed Columns1" = Table.RemoveColumns(#"Expanded Projects", {"ProjectID", "IssueID", "ViewPoints"},
    #"Renamed Columns1" = Table.RenameColumns(#"Removed Columns1", {"ProjectID", "IssueID", "ViewPoints"},
    #"Changed Type" = Table.TransformColumnTypes(#"Renamed Columns1", {"ProjectID", "IssueID", "ViewPoints"},
    #"Invoked Custom Function1" = Table.AddColumn(#"Changed Type", "Issues", each [Issues]),
    #"Removed Errors" = Table.RemoveRowsWithErrors(#"Invoked Custom Function1", "Issues",
    #"Expanded Issues" = Table.ExpandTableColumn(#"Removed Errors", "Issues", {"Issues", "ViewPoints"},
    #"Filtered Rows" = Table.SelectRows(#"Expanded Issues", each true),
    #"Renamed Columns2" = Table.RenameColumns(#"Filtered Rows", {"Id", "IssueID", "ViewPoints"},
    #"Changed Type1" = Table.TransformColumnTypes(#"Renamed Columns2", {"ProjectID", "IssueID", "ViewPoints"},
    #"Removed Columns2" = Table.RemoveColumns(#"Changed Type1", {"Description", "ViewPoints"},
    #"Sorted Rows" = Table.Sort(#"Removed Columns2", {"Number", Order.Descending},
    #"Invoked Custom Function2" = Table.AddColumn(#"Sorted Rows", "ViewPoints", each GetImages([ProjectID], [IssueID])),
    #"Removed Errors1" = Table.RemoveRowsWithErrors(#"Invoked Custom Function2", "ViewPoints",
    #"Expanded ViewPoints" = Table.ExpandTableColumn(#"Removed Errors1", "ViewPoints", {"ViewPoints", "IssueID"},
in
    #"Expanded ViewPoints"
```

APPLIED STEPS

- Source
- Converted to Table
- Expanded Column1
- Renamed Columns
- Removed Columns
- Invoked Custom Function
- Expanded Projects
- Removed Columns1
- Renamed Columns1
- Changed Type
- Invoked Custom Function1
- Removed Errors
- Expanded Issues
- Filtered Rows
- Renamed Columns2
- Changed Type1
- Removed Columns2
- Sorted Rows
- Invoked Custom Function2
- Removed Errors1
- Expanded ViewPoints

BIM Track in Power BI

Example:
Issue 239

Clipboard

External data

Insert

Custom visuals

Themes

Relationships

Calculations

Share

Issue Images

Issue Comments

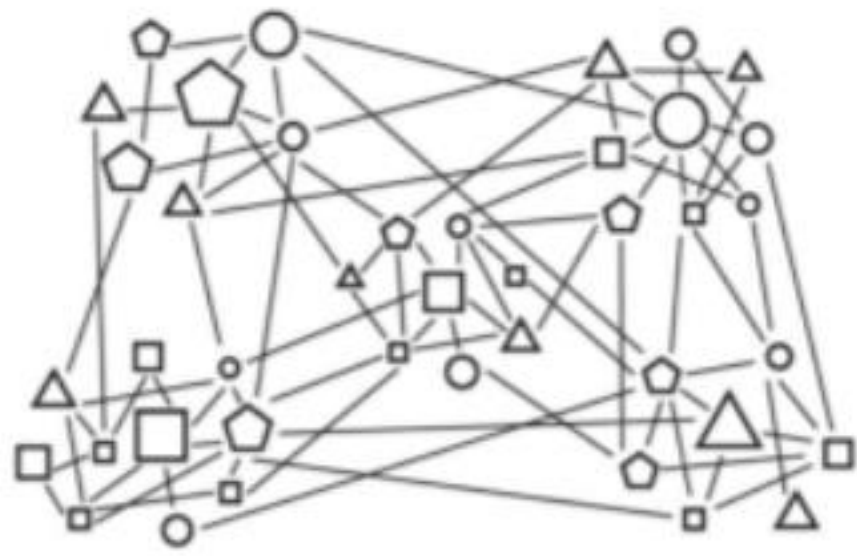
Issue Attachments

IssueID	Title	Number	ViewPoints.ThumbnailUrl
738946	P/SGC-05-UG-...	240	
738945	SGC/E-05-UG-...	239	
738945	SGC/E-05-UG-...	239	
738945	SGC/E-05-UG-...	239	
738944	SGC/E-COND-...	238	
738943	SGC/P -05-UG...	237	
738928	E-LIGHTS/M-P...	236	
738928	E-LIGHTS/M-P...	236	

IssueID	Issue Number	Comments.Comment
619776	1	This is issueid 619776 in BI which is number 1 in BIMTrack.
632032	10	Conduit elevations are pinned to achieve RHO calculations. 20% of
632032	10	DID WE NOT RESOLVE THIS TWO WEEKS AGO? I THOUGHT GRANIT
632032	10	I am unable to adjust the roof drain line vertically due to minimum s
632883	21	I am placing a blanket statement on these clashes that we have beer
632883	21	This file moved/added these supports on 10/26/2018. Stem walls ha
632886	23	This file moved/added these supports on 10/26/2018. Stem walls ha
632888	25	This file moved/added these supports on 10/26/2018. Stem walls ha
632892	29	I am placing a blanket statement on these clashes that we have beer
632892	29	This file moved/added these supports on 10/26/2018. Stem walls ha
685373	195	Granite to coordinate blockouts with CSI on all trench drains the cro
685373	195	MWH04N-UG-SIGNOFF
685374	196	Granite to submit and RFI to get approval from Navix for a variance
685374	196	MWH04N-UG-SIGNOFF
685375	197	Granite lowered the storm going north across the street from 04S to
685375	197	MWH04N-UG-SIGNOFF
738896	204	Philip, Can we determine if this clean out has already been installed.
738899	207	M-Pipe trapeze still needs to move.
738901	209	M-Pipe trapeze still needs to adjust.
738917	225	M-Pipe model needs to be updated.
738943	237	APPROVED VIA COORDINATION MEETING CALL 12/10/18 BY DESIG
738943	237	Clash to remain open pending response on RFI#227
738943	237	Granite has adjusted these pipes outside of building in recent upload
738943	237	RFI #227 response was that domestic water to be moved to the east
738943	237	RFI 227 was created by Apollo for this issue.
738944	238	Approved via RFI #187
738944	238	RFI #187
738944	238	WAITING ON RFI RESPONSE
738945	239	Approval pending RFI#208 response
738945	239	AWAITING RFI RESPONSE
738946	240	APPROVED COORDINATION CHANGE
738947	241	APPROVED RFI
738947	241	RFI #203
738948	242	APPROVED RFI
738948	242	RFI #203
738949	243	FIELD COORDINATE BLOCK OUT FOR FP LINE.
768816	245	Granite and VECA will need to work closely on this shift prior to then
768816	245	Have solution to move storm approx. 7'-0" to the south to avoid con
768816	245	poured
768816	245	RFI approved
768816	245	RFI sent
768818	247	Need to adjust mechanical low pipe supports to get them out of con
768818	247	Need to confirm how far into the LV duct bank these low pipe supp
768819	248	Need to adjust mechanical low pipe supports to get them out of con

IssueID	Issue N...	Attachments.Name	Attachments.Uri
619776	1	BIMTrack to BI Test.docx	https://storbtprod.blob.core.winc
738945	239	vp0196.jpg	https://storbtprod.blob.core.winc
738945	239	vp0197.jpg	https://storbtprod.blob.core.winc
738945	239	vp0198.jpg	https://storbtprod.blob.core.winc
738945	239	vp0199.jpg	https://storbtprod.blob.core.winc
1024050	342	#342.jpg	https://storbtprod.blob.core.winc

MS_All Issues MS_Active Issues MS_Mapping Images_Comments_Attachments



BIM Track Structure
BIM Track API Structure
BIM Track in Power BI
(M Language)
Disciplines (DAX)

Zones
←→

Element ID
←→
SQL
PowerApp

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Assemble: Tracking Rooms Installation-Scanning Bar Code
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Installation Status Tracking

4 Levels
(Conditional
Formatting)

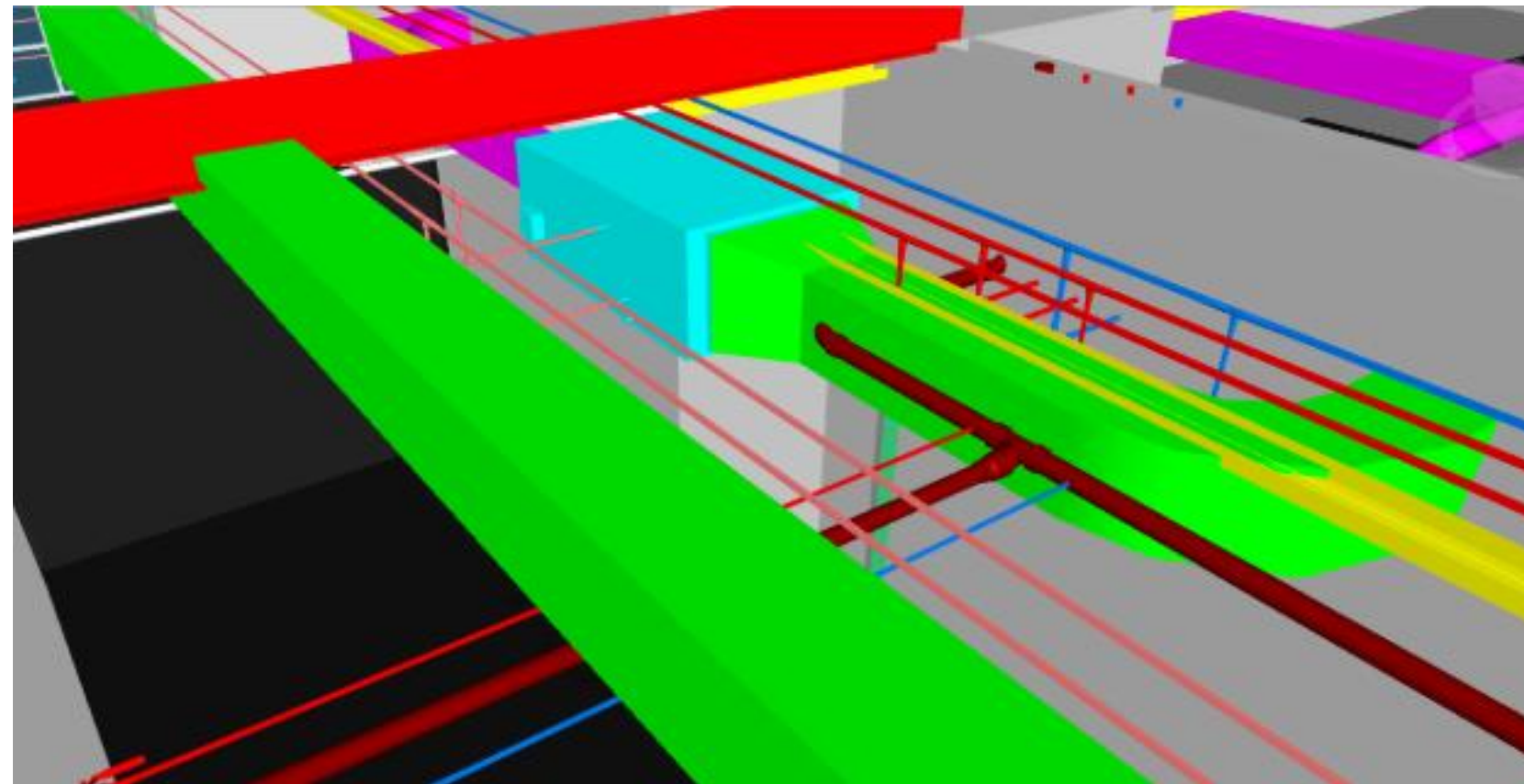
Front end: DAX
Back end: M Language
Python Scripts

2 Levels
(Binary)

Installed Or Not
Forecasting



Disciplines (DAX)

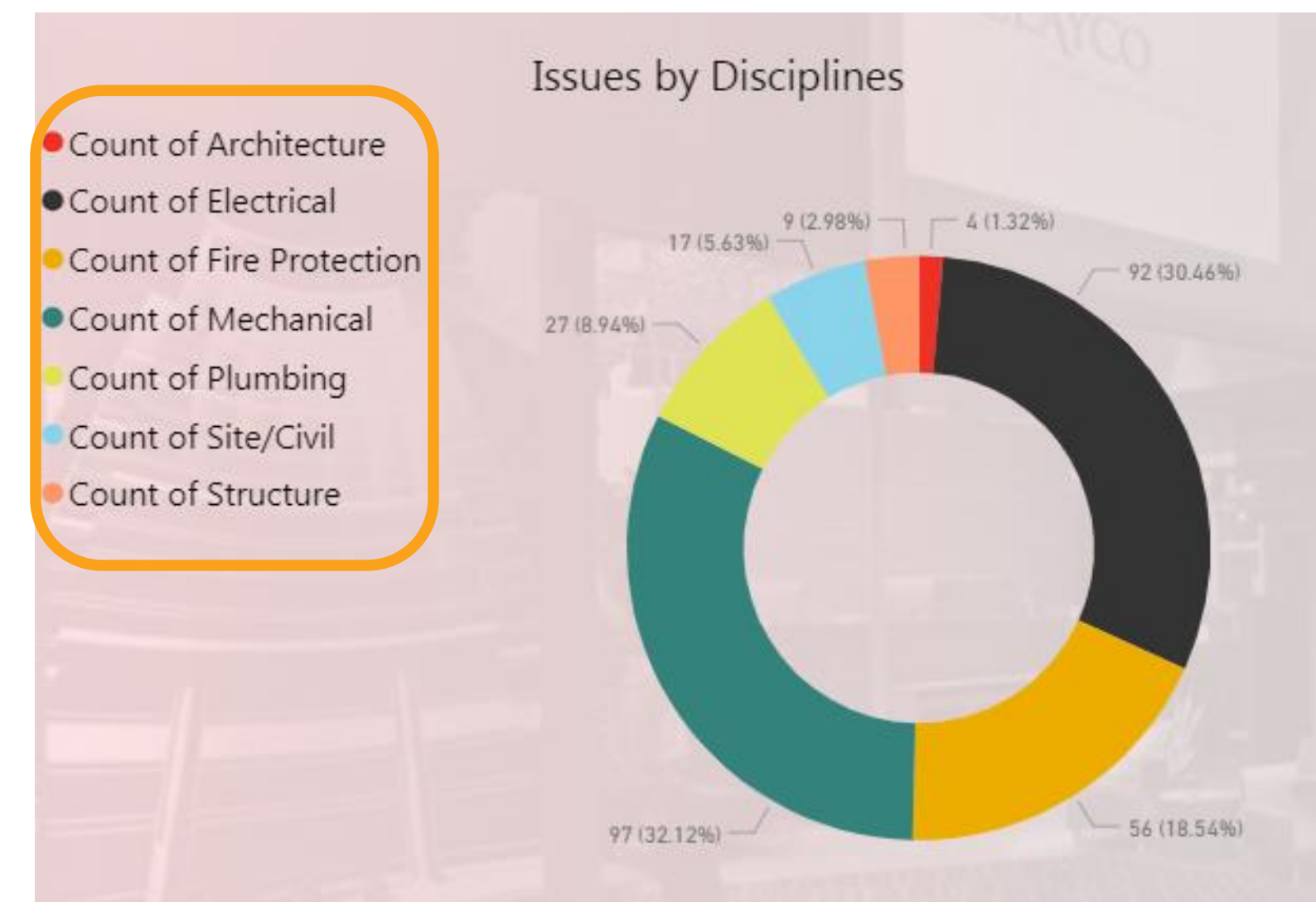
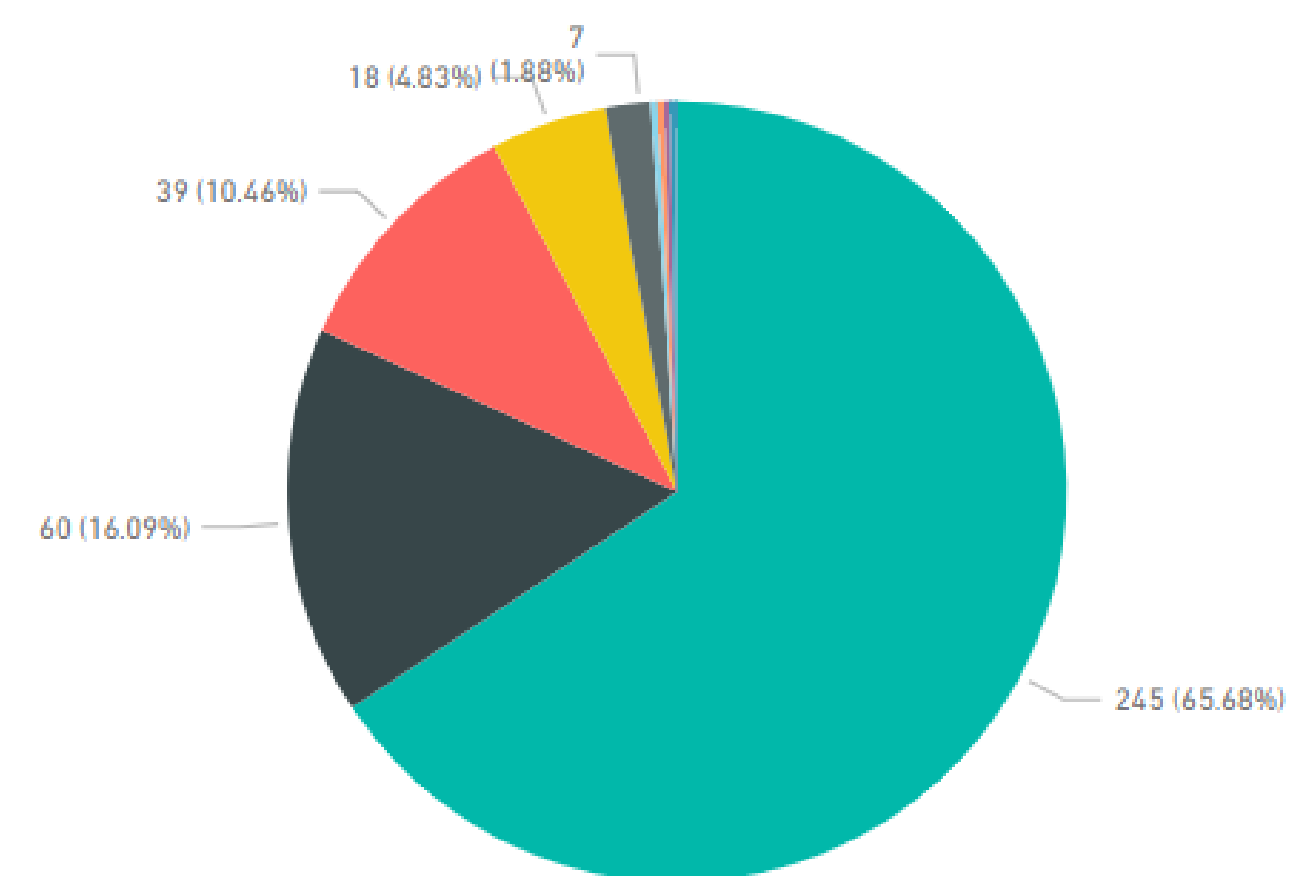


Combined Disciplines for an Issue

Goal: Separated Disciplines for an Issue



Issues by Disciplines



Disciplines (DAX)

Each Discipline is a New Column in Issues Tab

HomeModelingHelp

CutCopyFormat Painter

Get DataRecent SourcesEnter DataEdit QueriesRefresh

New PageNew VisualAsk A QuestionButtonsImageShapes

From MarketplaceFrom FileSwitch ThemeManage Relationships

New MeasureNew ColumnNew Quick MeasurePublish

ClipboardExternal dataInsertCustom visualsThemesRelationshipsCalculationsShare

Liang Gong

1 Architecture =

2 LOOKUPVALUE (

3 'Disciplines'[Disciplines.Id],

4 Disciplines[Disciplines.Name], "Architecture",

5 Disciplines[IssueID], Issues[IssueID]

6)

	Status.Color	Status	Status.Id	Type.Color	Type Name	Type.Id	Electrical	Site/Civil	Plumbing	Fire Protection	Mechanical	Architecture	Structure	AssignedTo.Id	AssignedTo.En
	#9f9f9f	Closed	42583	#ff0004	Clash	48395				Fire Protection				18143	dave@cascadefir
	#9f9f9f	Closed	42583	#ff0004	Clash	48395					Mechanical			18165	pkronberg@tcmc
	#9f9f9f	Closed	42583	#ff0004	Clash	48395			Plumbing					18169	tmichalowski@tc
	#9f9f9f	Closed	42583	#ff0004	Clash	48395					Mechanical			18165	pkronberg@tcmc
	#9f9f9f	Closed	42583	#ff0004	Clash	48395					Mechanical			18165	pkronberg@tcmc
	#9f9f9f	Closed	42583	#ff0004	Clash	48395					Mechanical			18165	pkronberg@tcmc
	#9f9f9f	Closed	42583	#ff0004	Clash	48395					Mechanical			18165	pkronberg@tcmc
	#9f9f9f	Closed	42583	#ff0004	Clash	48395					Mechanical			18165	pkronberg@tcmc
	#9f9f9f	Closed	42583	#ff0004	Clash	48395					Mechanical			18165	pkronberg@tcmc
	#9f9f9f	Closed	42583	#ff0004	Clash	48395					Mechanical			18165	pkronberg@tcmc
	#9f9f9f	Closed	42583	#ff0004	Clash	48395					Mechanical			18165	pkronberg@tcmc
	#9f9f9f	Closed	42583	#ff0004	Clash	48395				Fire Protection				18143	dave@cascadefir
	#9f9f9f	Closed	42583	#ff0004	Clash	48395			Plumbing			60364		18169	tmichalowski@tc
	#9f9f9f	Closed	42583	#ff0004	Clash	48395			Plumbing			60364		18169	tmichalowski@tc
	#9f9f9f	Closed	42583	#ff0004	Clash	48395					Mechanical			18167	shawn.simlnessi
	#9f9f9f	Closed	42583	#ff0004	Clash	48395				Fire Protection	Mechanical			18165	pkronberg@tcmc
	#9f9f9f	Closed	42583	#ff0004	Clash	48395				Fire Protection				18143	dave@cascadefir
	#9f9f9f	Closed	42583	#ff0004	Clash	48395							60365	18201	jbush@steelfab-i
	#9f9f9f	Closed	42583	#ff0004	Clash	48395					Mechanical			18167	shawn.simlnessi
	#9f9f9f	Closed	42583	#ff0004	Clash	48395		Civil/Site					60365	18159	lucas.macmillan@
	#9f9f9f	Closed	42583	#ff0004	Clash	48395	Electrical				Mechanical			18165	pkronberg@tcmc

Fields

Search

Disciplines

from 619776 to test...

HubID

Images

Issues

Architecture

AssignedTo.Email

AssignedTo.FirstNa...

AssignedTo.Id

AssignedTo.LastNa...

Author.LastName

ClosingDate

Confidentiality.Tea...

CreationDate

CreationSource

Description

Disciplines

DueDate

Electrical

Fire Protection




Disciplines (DAX)

Disciplines Table

= Table.SelectRows("#Replaced Value4", each ([ProjectID] = "9138"))										
	ABC 123	HudID	ABC 123	ProjectID	ABC 123	IssueID	ABC 123	Disciplines.Name	ABC 123	Disciplines.Id
1		4648		9138		619776		null		null
2		4648		9138		619777		null		null
3		4648		9138		619779		null		null
4		4648		9138		619780		null		null
5		4648		9138		619817		null		null
6		4648		9138		619818		null		null
7		4648		9138		627738		Electrical		Electrical
8		4648		9138		632032		Electrical		Electrical
9		4648		9138		632653		Electrical		Electrical
10		4648		9138		632653		Site/Civil		Civil/Site
11		4648		9138		632654		Electrical		Electrical
12		4648		9138		632655		Electrical		Electrical
13		4648		9138		632656		Electrical		Electrical
14		4648		9138		632657		Electrical		Electrical
15		4648		9138		632657		Plumbing		Plumbing
16		4648		9138		632658		Electrical		Electrical
17		4648		9138		632659		Electrical		Electrical
18		4648		9138		632660		Electrical		Electrical
19		4648		9138		632661		Electrical		Electrical
20		4648		9138		632662		Plumbing		Plumbing
21		4648		9138		632883		Electrical		Electrical
22		4648		9138		632884		Electrical		Electrical
23		4648		9138		632886		Electrical		Electrical
24		4648		9138		632887		Electrical		Electrical
25		4648		9138		632888		Electrical		Electrical
26		4648		9138		632889		Electrical		Electrical
27		4648		9138		632890		Electrical		Electrical

Disciplines (DAX)

Set Up New Column for Each Discipline in Issues Table by using Disciplines Table

```
1 Architecture =  
2 LOOKUPVALUE (  
3     'Disciplines'[Disciplines.Id],  What to return?  
4     Disciplines[Disciplines.Name], "Architecture",  Filter by what?  
5     Disciplines[IssueID], Issues[IssueID]  What to match?  
6 )
```

Disciplines (DAX)

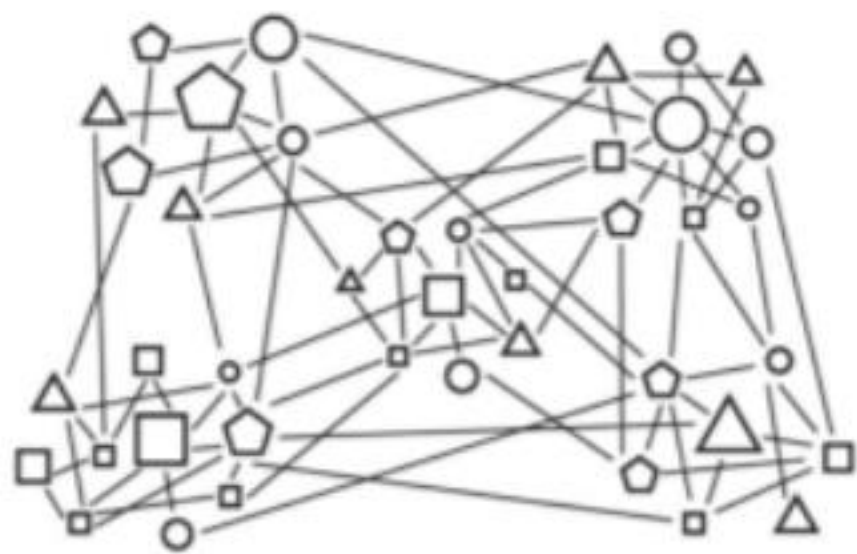
VLOOKUP in Excel is Different

Syntax

=VLOOKUP (value, table, col_index, [range_lookup])

Arguments

- **value** - The value to look for in the first column of a table.
- **table** - The table from which to retrieve a value.
- **col_index** - The column in the table from which to retrieve a value.
- **range_lookup** - [optional] TRUE = approximate match (default). FALSE = exact match.



BIM Track Structure
BIM Track API Structure
BIM Track in Power BI
(M Language)
Disciplines (DAX)

Zones

Element ID

SQL
PowerApp

BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code

Assemble: Tracking Rooms Installation-Scanning Bar Code

P6 and Assemble Schedule Integrator

Model Mashups: Design Iterations and Design vs Construction

Power BI Data Connector

Installation Status Tracking

4 Levels
(Conditional
Formatting)

Front end: DAX
Back end: M Language
Python Scripts

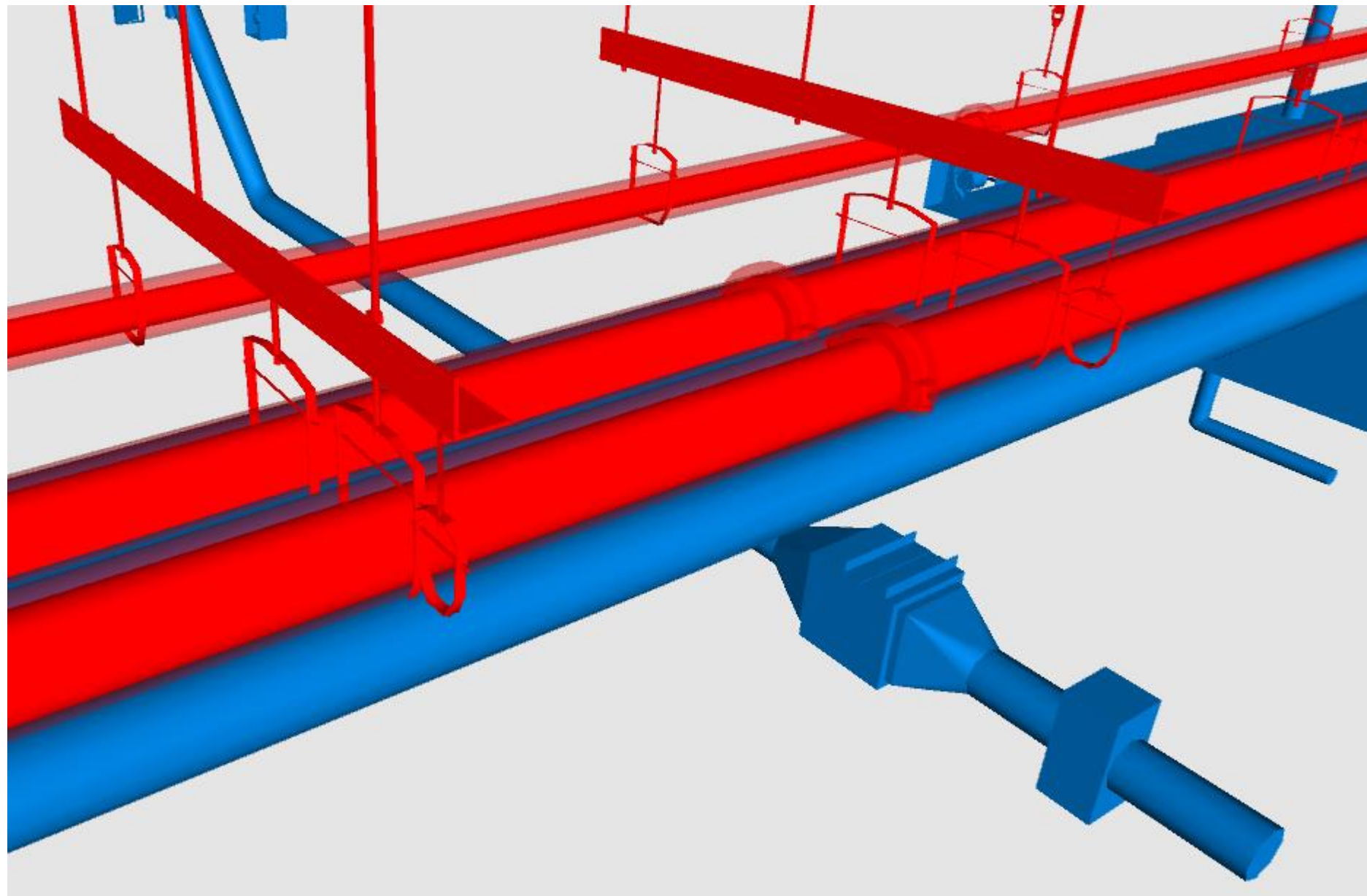
2 Levels
(Binary)

Installed Or Not
Forecasting

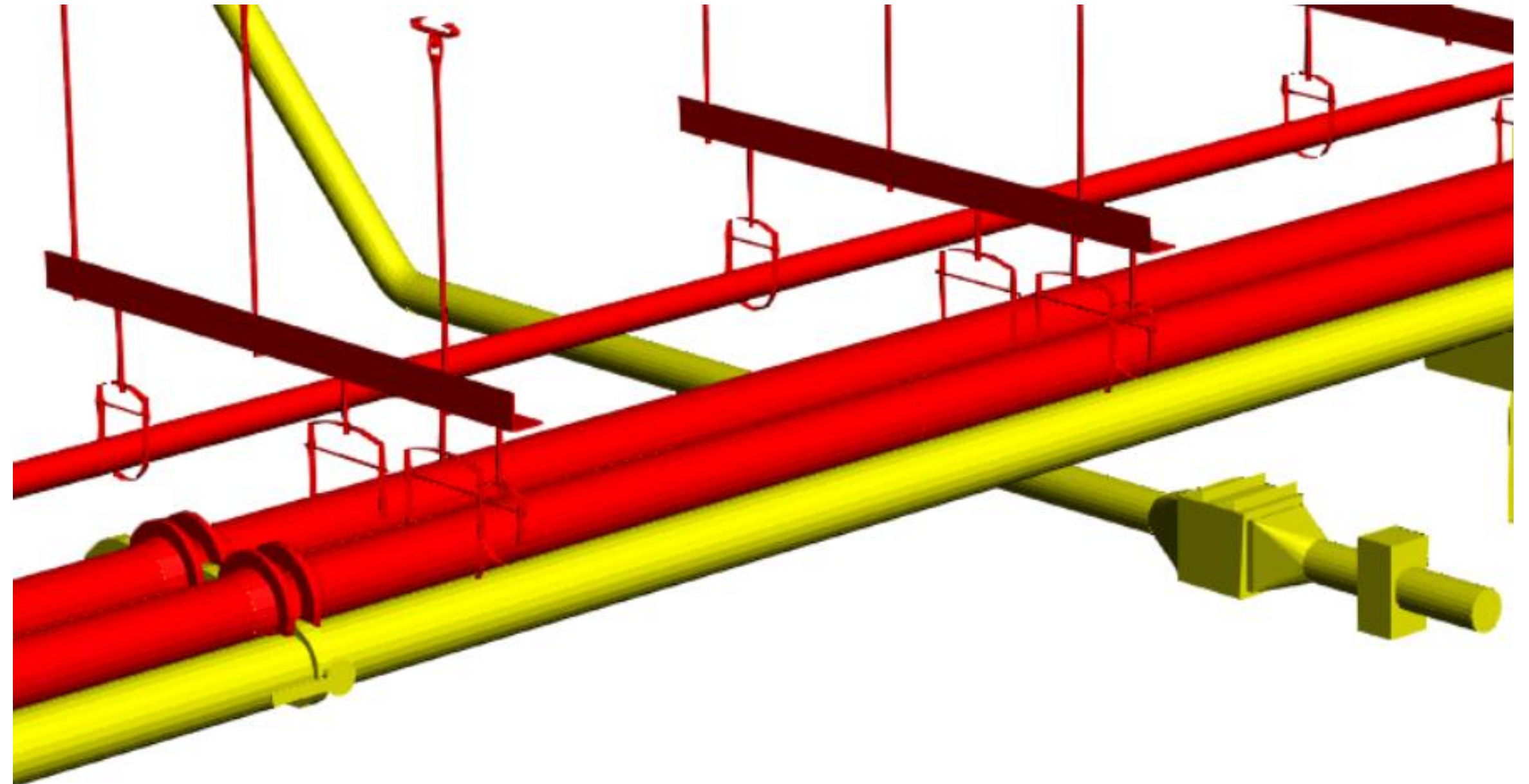


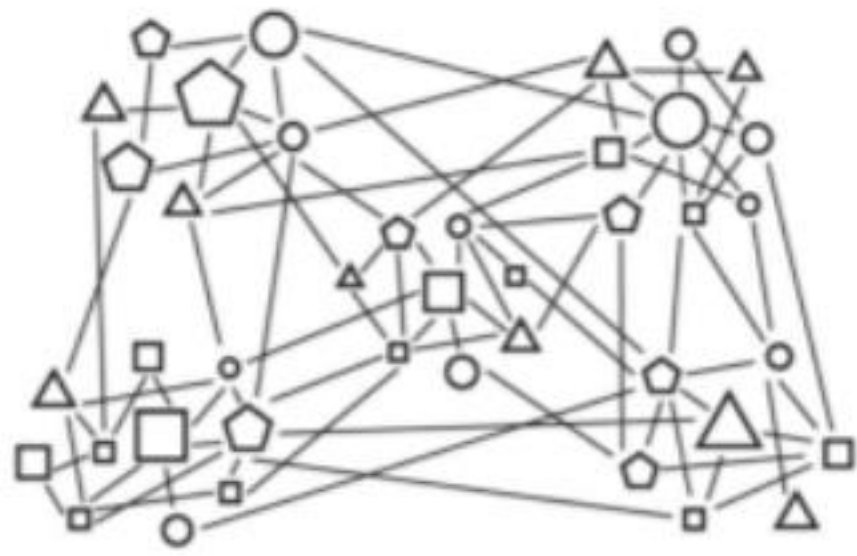
Model Mashups: Design Iterations Easy Design vs. Construction Hard

B AUTODESK®
BIM 360™ GLUE



 **assemble**
AN AUTODESK COMPANY





BIM Track Structure
BIM Track API Structure
BIM Track in Power BI
(M Language)
Disciplines (DAX)

Zones

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(Binary)

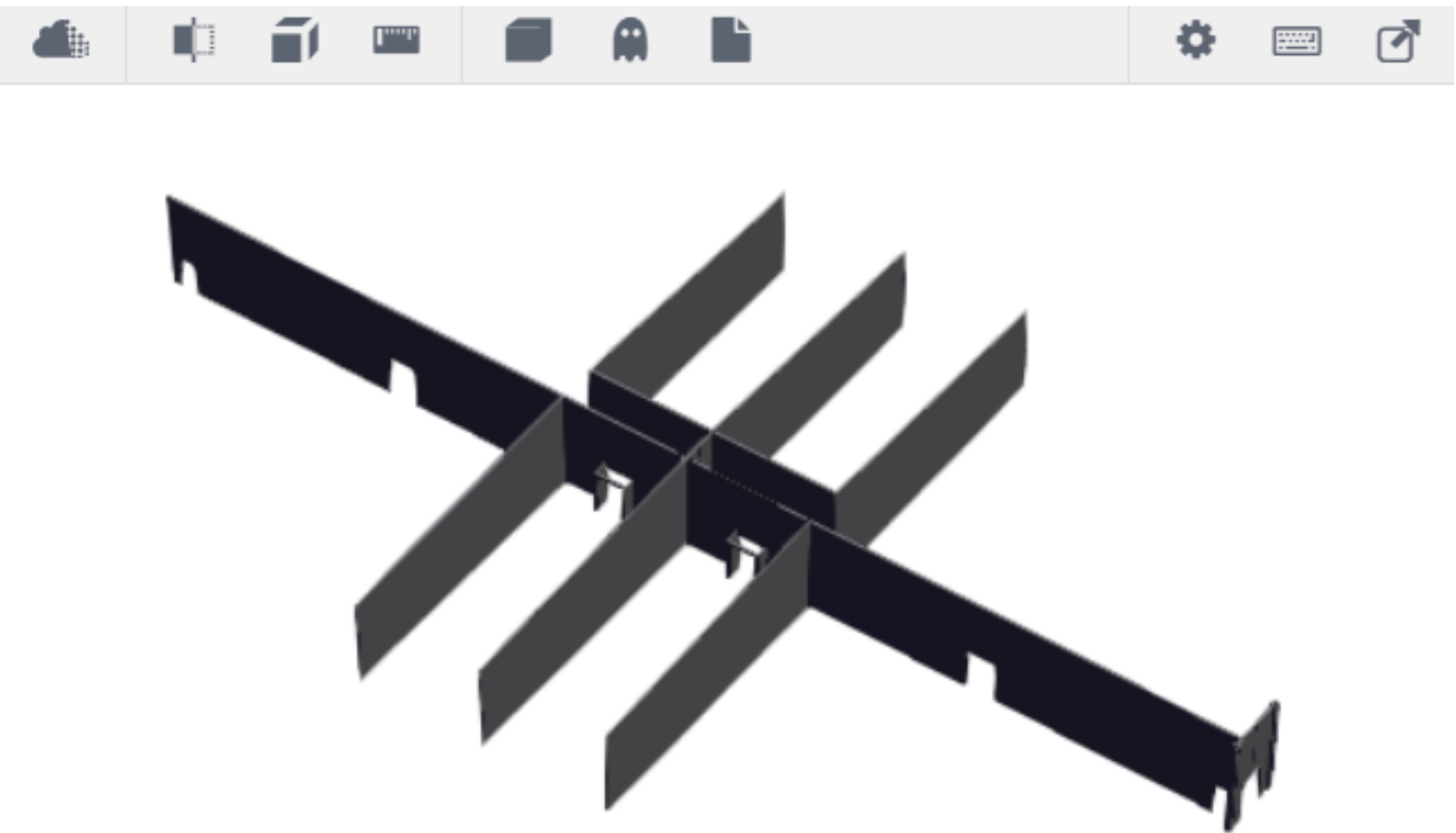
Installed Or Not
Forecasting



P6 and Assemble Schedule Integrator

Group by: Activity ID and Start Date Columns \$ Estimate Import/Export

<input type="checkbox"/>	Name	Quantity	Unit
<input type="checkbox"/>	▼ C1A.04N.1190	1,677.86	SF
<input type="checkbox"/>	▶ 3/4/2019	1,677.86	SF
<input type="checkbox"/>	▼ C1B.04N.1210,C1B.04N.1330,C1B.04N.1440,C1B.04N.1450,...	1,693.40	SF
<input type="checkbox"/>	▶ 3/7/2019	1,693.40	SF
<input type="checkbox"/>	▶ C1C.04N.1260	1,677.86	SF
<input type="checkbox"/>	▶ 3/13/2019	1,677.86	SF
<input type="checkbox"/>	▼ C1D.04N.1210	1,693.40	SF
<input type="checkbox"/>	▶ 3/13/2019	1,693.40	SF



Assemble Properties

Installed As Designed	No
Installation Status	50
Man Hours	
QR Code	
Start Date	4/12/2019
Finish Date	4/12/2019
Act Start Date	4/13/2019
Act Finish Date	4/13/2019
Task Code	
Critical Path	
Task Name	
Compass Tag	
CX Level 1 from Compass	
CX Status from	

Model Properties

Instance Type

Schedule Input

Sync from P6

Direct Input into Assemble (Web or App)

P6 and Assemble Schedule Integrator



ScheduleIntegrator.exe

File

Create Link

Delete All Links

Delete Selected Links

Review

Hide All

Hide Selected

Hide Scheduled

Show All

Show Selected

Show Scheduled

Schedule Zoom Level:

Busy Indicator

Find Inv. Tasks

Publish

Commit

Name	Takeoff Quantity	Unit	Activity ID	Model Name
<input type="checkbox"/> 1984960	271.17	SF		215_FORUM_ARCH_ALL_ALL_detached
<input type="checkbox"/> 1985210	271.17	SF		215_FORUM_ARCH_ALL_ALL_detached
<input type="checkbox"/> 1985604	271.17	SF		215_FORUM_ARCH_ALL_ALL_detached
<input type="checkbox"/> 1985702	271.17	SF		215_FORUM_ARCH_ALL_ALL_detached
<input type="checkbox"/> 1985710	271.17	SF		215_FORUM_ARCH_ALL_ALL_detached
<input type="checkbox"/> 1985759	271.17	SF		215_FORUM_ARCH_ALL_ALL_detached
<input checked="" type="checkbox"/> 1985814	271.17	SF		215_FORUM_ARCH_ALL_ALL_detached
<input type="checkbox"/> 1985849	271.17	SF		215_FORUM_ARCH_ALL_ALL_detached
<input type="checkbox"/> 2738114	0.00	SF		215_FORUM_ARCH_ALL_ALL_detached
<input type="checkbox"/> 2738121	248.66	SF		215_FORUM_ARCH_ALL_ALL_detached
<input type="checkbox"/> 2739225	200.09	SF		215_FORUM_ARCH_ALL_ALL_detached

Properties

Select

Pin

Name

Value

Assemble

General

Model

Constraints

Dimensions

Energy Analysis

Quantity

Area

Base Offset (0

Level

Level (Invalid

Limit Offset (8

Upper Limit

Area (SF)

Computation

Perimeter (LF

Unbounded F

Volume (CY)

Actual Lightir

Actual Lightir

Actual Power

Actual Power

Area per Pers

Base Lighting

Base Power L

Calculated Cc

779...ays

792...ays

5607...ays

5607...ays

5607...ays

5607...ays

ation	Start	Finish
5461...ys	4/17/2019	4,
5461...ys	4/17/2019	4,
5461...ys	4/19/2019	4,
5461...ys	4/19/2019	4,
5461...ys	4/19/2019	4,
5461...ays	4/22/2019	
5461...ays	4/22/2019	
5461...ys	4/23/2019	
5461...ys	4/23/2019	4,
5461...ays	4/25/2019	
5461...ys	4/25/2019	4,
5461...ays	4/26/2019	
5461...ys	4/29/2019	
5461...ys	4/30/2019	
5461...ys	5/3/2019	
5461...ys	5/4/2019	
5461...ys	5/4/2019	
5461...ys	5/10/2019	5,
5461...ays	5/15/2019	
779...ays	8/1/2018	9/
792...ays	8/1/2018	9/
5607...ays	8/1/2018	8,
5607...ys	8/1/2018	
5607...ys	8/1/2018	
5607...ays	8/1/2018	8,
5607...ys	8/1/2018	

Aug 01 2018

Aug 05 2018

W T F S S M T W T F S S

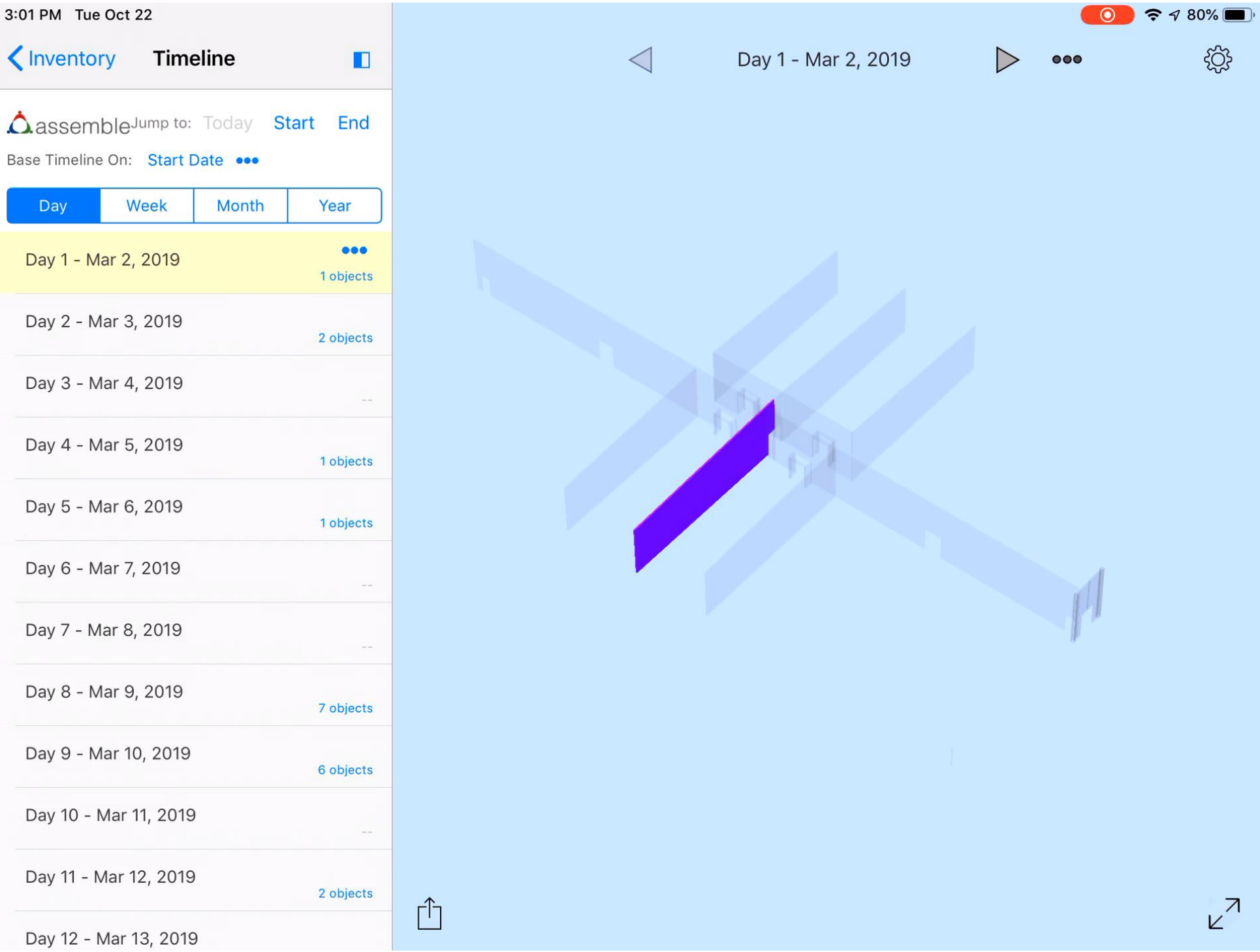
P6

ORACLE

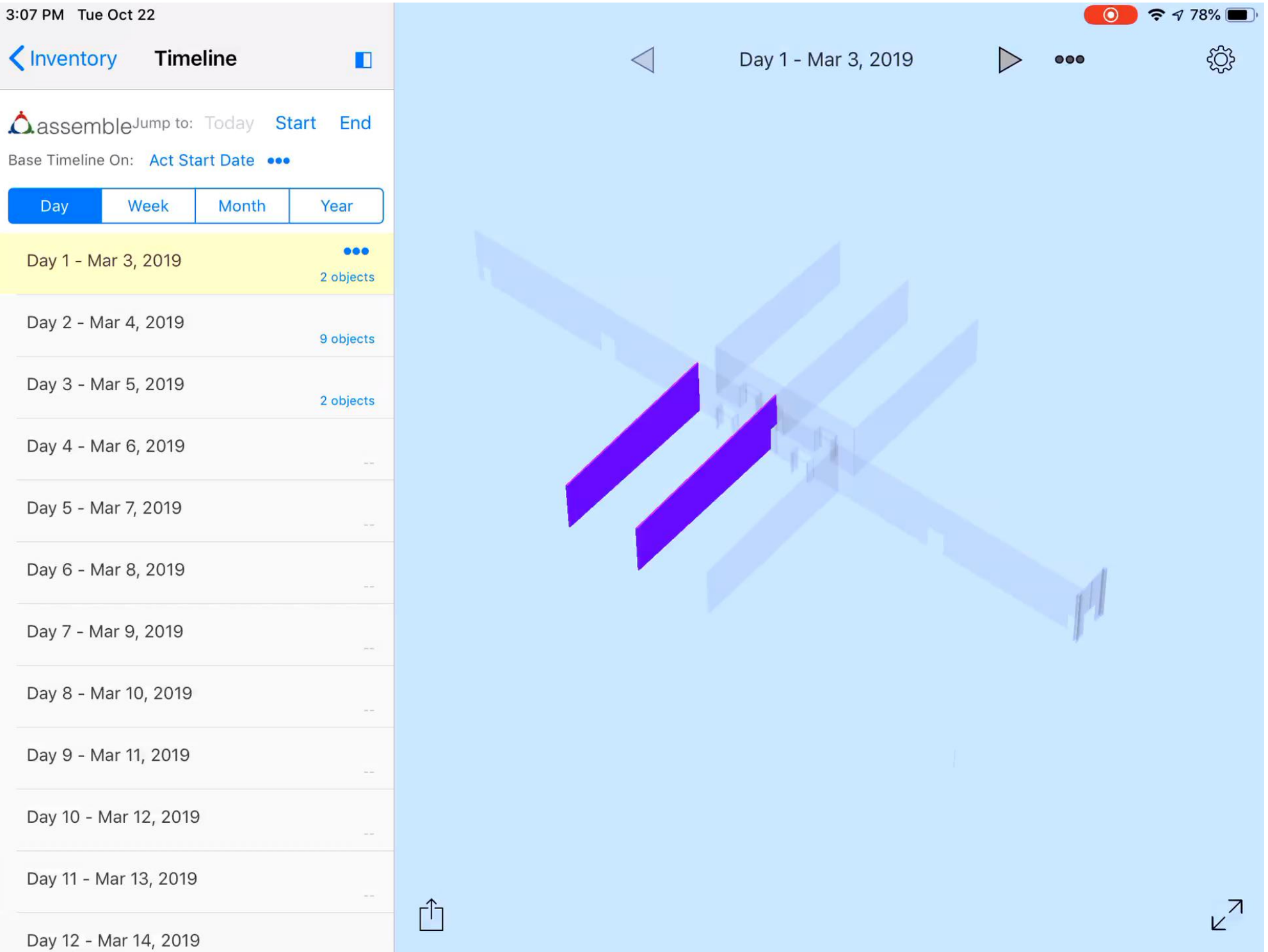
assemble™

P6 and Assemble Schedule Integrator

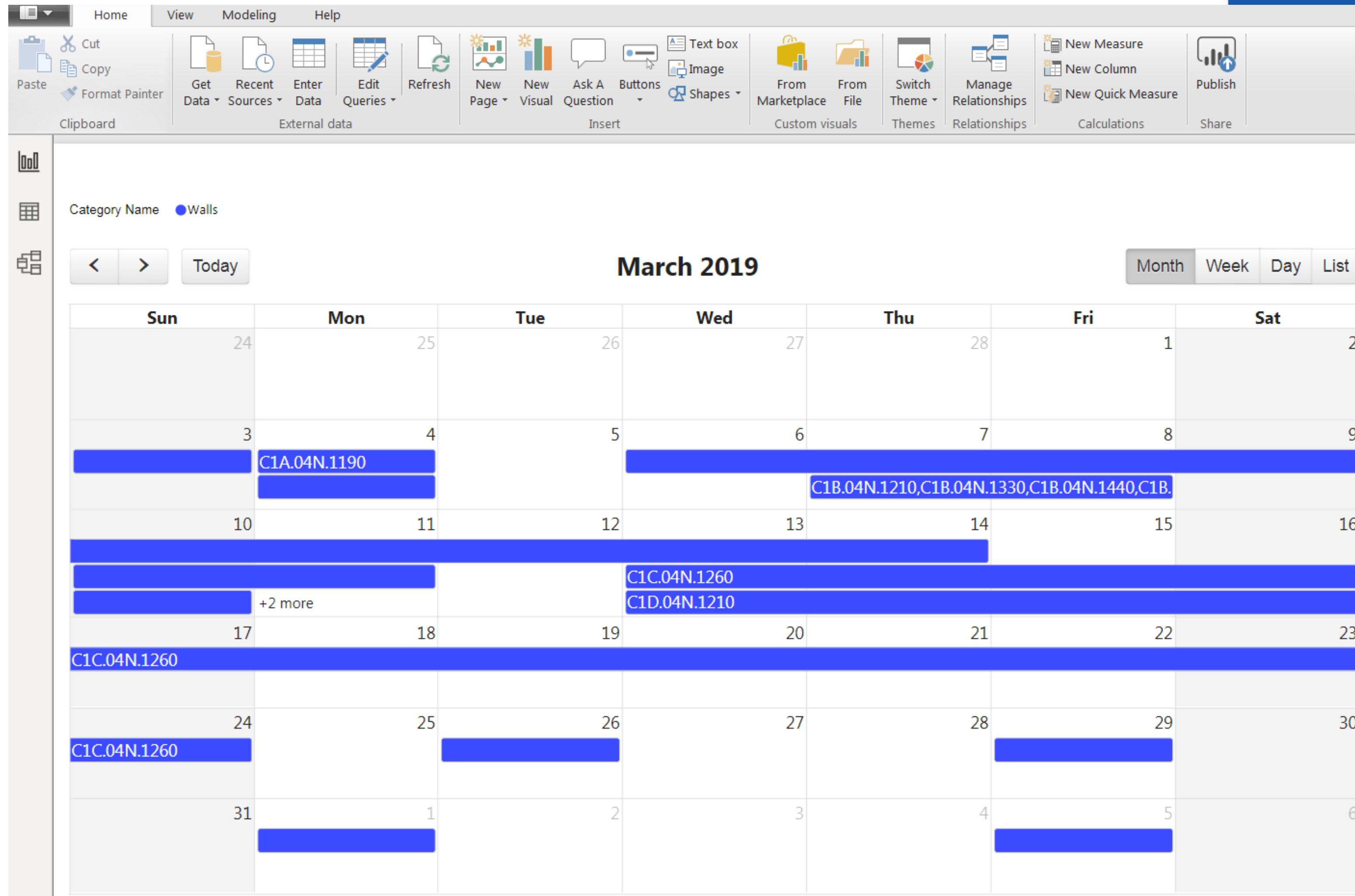
Start Date



Actual Start Date

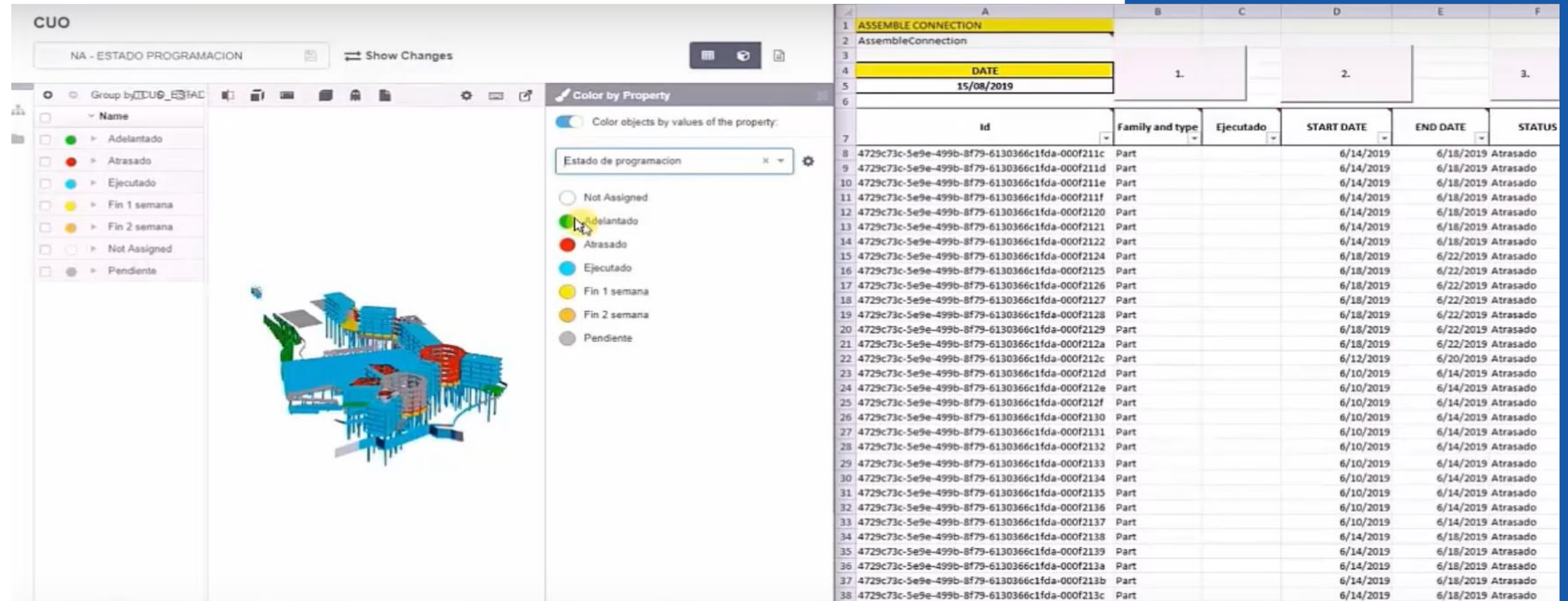


P6 and Assemble Schedule Integrator



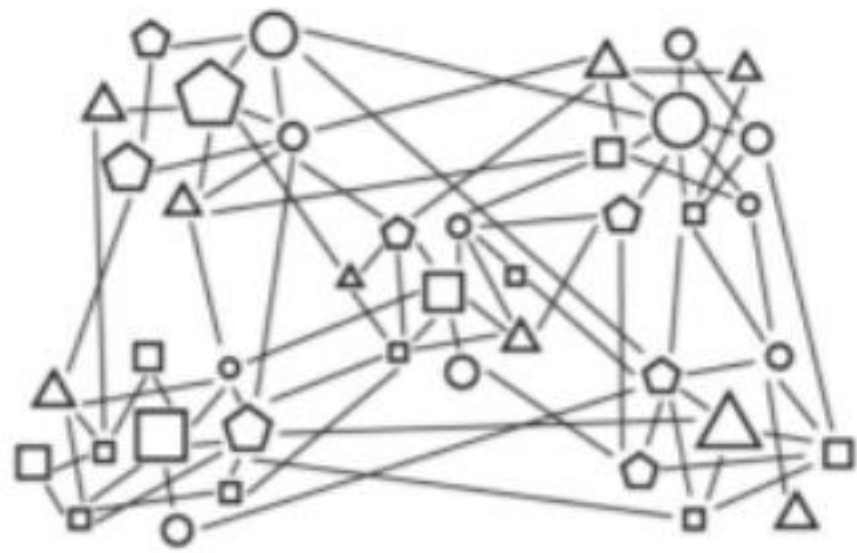
P6 and Assemble Schedule Integrator

Earned Value Analysis



EVA: Credit _ Assemble Webinar

“Controlling the Schedule & Construction Process through 5D BIM”



BIM Track Structure
BIM Track API Structure
BIM Track in Power BI
(M Language)
Disciplines (DAX)

Zones

Element ID

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PowerApp

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Power BI Data Connector

Installation Status Tracking

4 Levels
(Conditional
Formatting)

Front end: DAX
Back end: M Language
Python Scripts

2 Levels
(Binary)

Installed Or Not
Forecasting



Power BI Data Connector



Assemble Power BI - Setup Instructions

Thank you for choosing the Assemble Power BI Integration. We recommend that you read the instructions below before proceeding to download the add-in.

Model Version	v1 V01				v5 05			
Model Name	First Unit	Quantity	Unit Cost Average	Total Cost	First Unit	Quantity	Unit Cost Average	Total Cost
ARCHITECTURE	EA	237,698.86	\$0.00	\$0.00	EA	71,837.64	\$74.70	\$5,367.23
Casework	EA	61.00	\$0.00	\$0.00	EA	640.64	\$318.87	\$204,200.00
Columns	EA	23,090.27	\$0.00	\$0.00	EA	163.00	\$0.00	\$0.00
Curtain Panels	EA	1.00	\$0.00	\$0.00	EA	1.00	\$0.00	\$0.00
Wall Mullions	SF	2,154.91	\$0.00	\$0.00	EA	130.00	\$0.00	\$0.00
Doors	LF	1,197.76	\$0.00	\$0.00	EA	318.00	\$0.00	\$0.00
Furniture	EA	114.00	\$0.00	\$0.00	EA	2,109.38	\$357.23	\$753,300.00
	SF	76,923.25	\$0.00	\$0.00	EA	62.00	\$0.00	\$0.00
	EA	392.00	\$0.00	\$0.00	EA	392.00	\$0.00	\$0.00
		15.00	\$0.00	\$0.00	EA	20.00	\$0.00	\$0.00
		20.00	\$0.00	\$0.00	EA	505.00	\$0.00	\$0.00
Mechanical Equipment	EA	509.00	\$0.00	\$0.00				
	EA	12.00	\$0.00	\$0.00				
	EA	2,104.00	\$0.00	\$0.00				
Total	CY	342,075.27	\$0.00	\$0.00	CY	177,789.67	\$23.96	\$4,260,311.00



Fill out the form to access the Add-In.



Get quick access to Business and Project analytics

First Name

Liang

Last Name

Gong

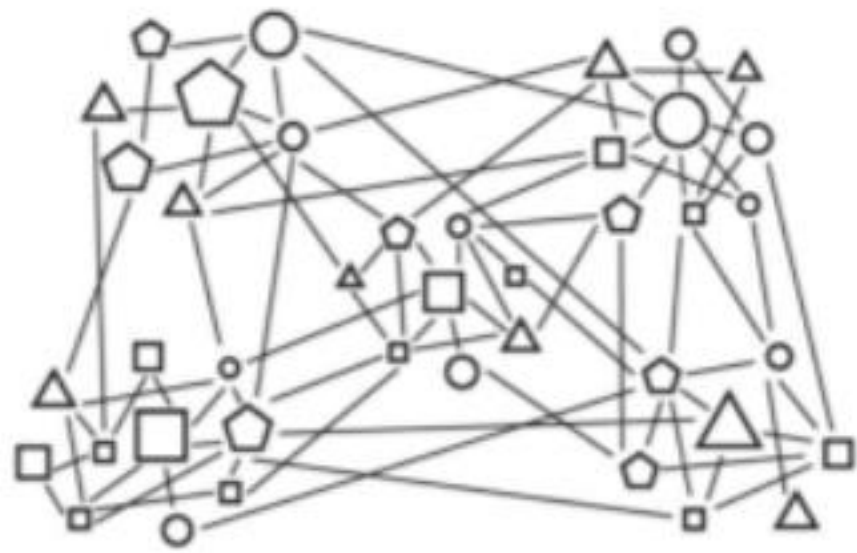
Company Name

Clayco

Email

gongl@claycorp.com

Submit



BIM Track Structure
BIM Track API Structure
BIM Track in Power BI
(M Language)
Disciplines (DAX)

Zones

Element ID
SQL
PowerApp

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Power BI Data Connector

Installation Status
Tracking

4 Levels
(Conditional
Formatting)

Front end: DAX
Back end: M Language
Python Scripts

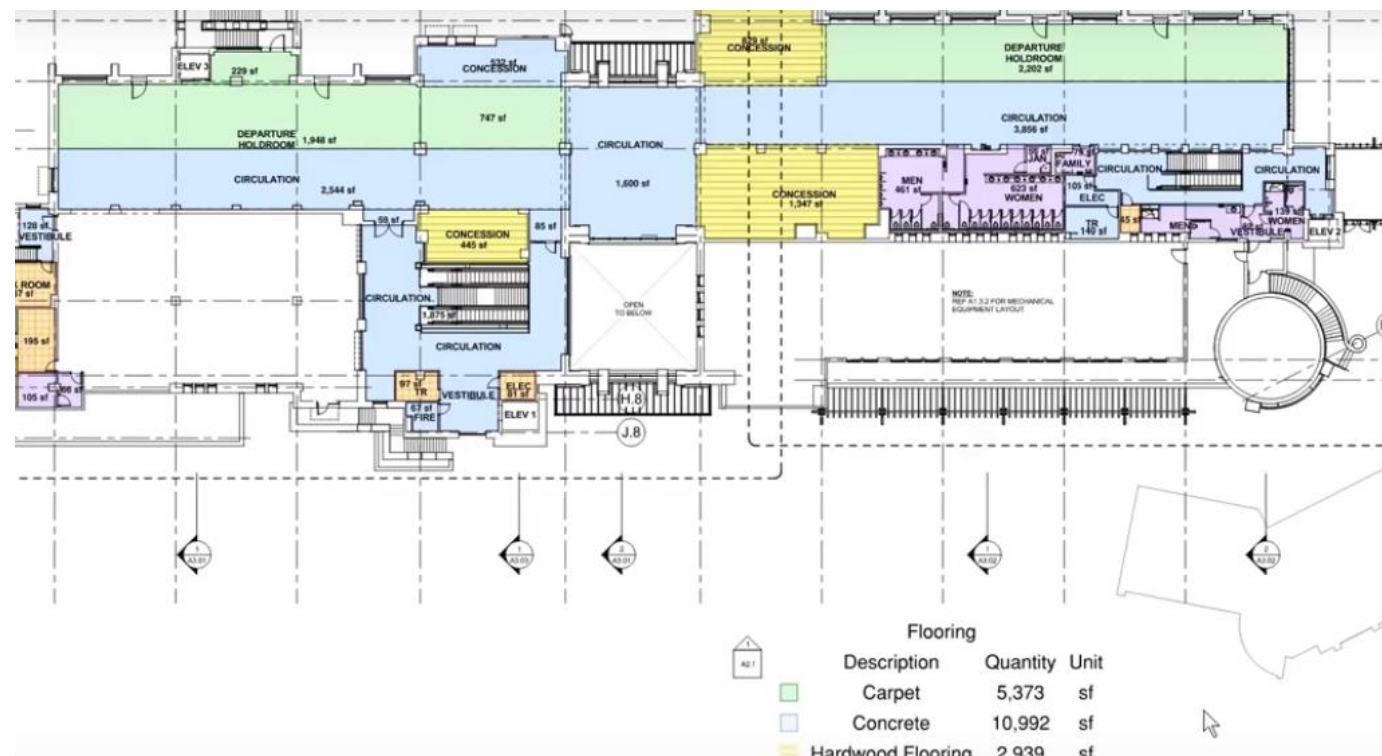
2 Levels
(Binary)

Installed Or Not
Forecasting



Installation Status Tracking

4 Levels

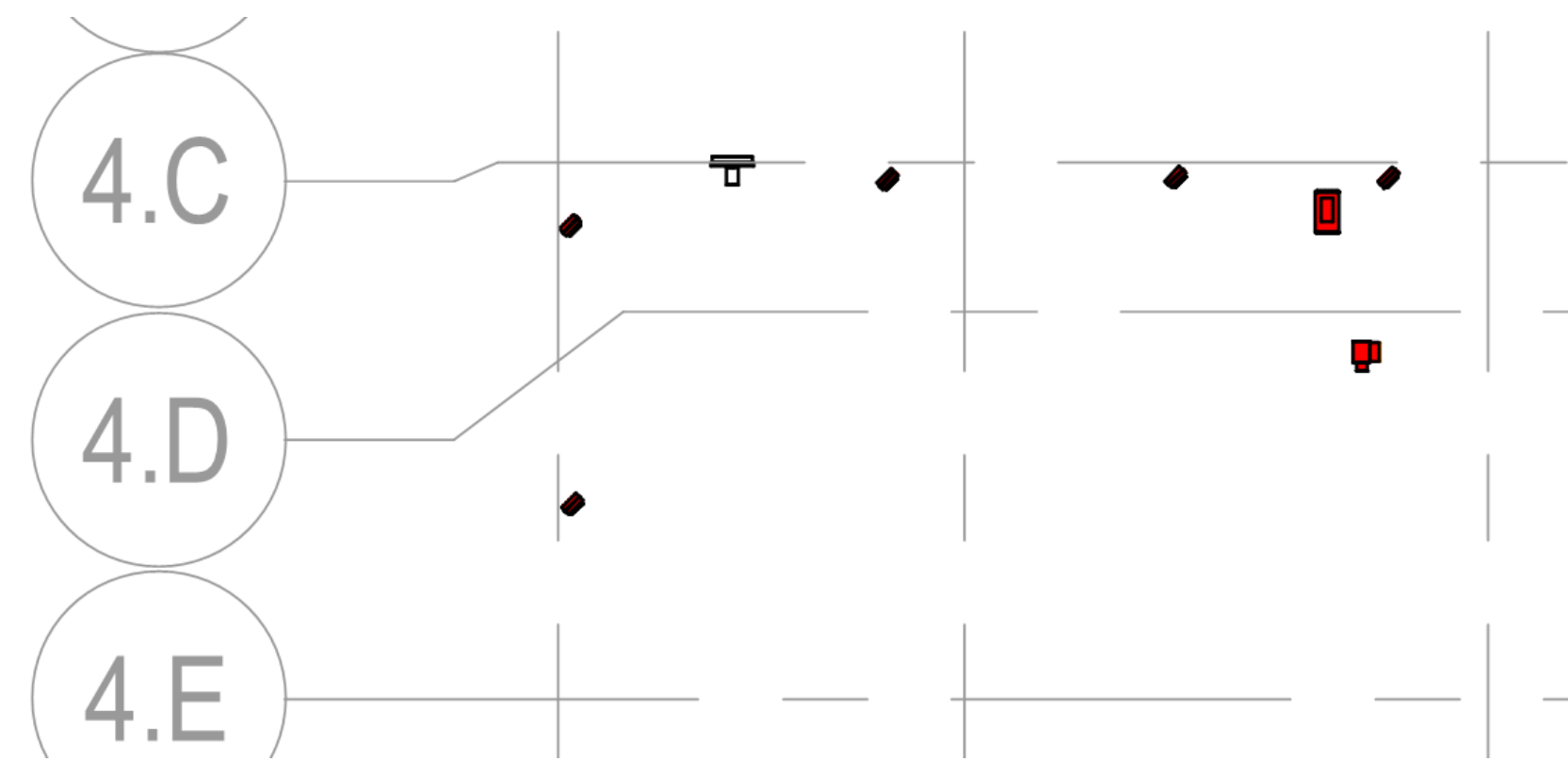


Installation status visualized on drawing



Installation Status Tracking

4 Levels



Installation status visualized on drawing

4 Level

SHEET NOTES

GENERAL NOTES

Delivered

Level 1 CX

Level 2 CX

Level 3 CX

STEVEN PESCE

Revisions

No.	Date	Description

PRESENTED BY CLAYCO VDC

Key Plan

Bar Code

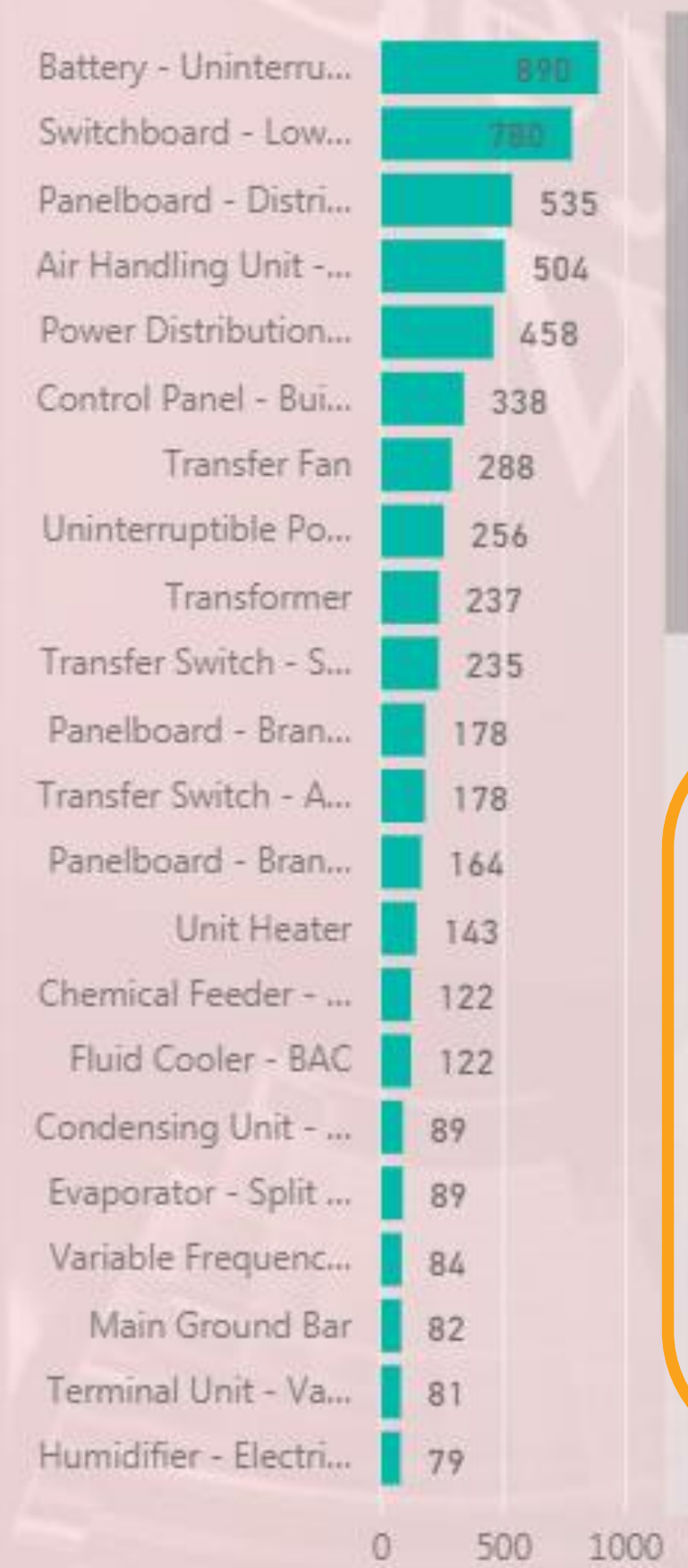
Sheet Title/Number

VDC CX TRACKING

CX TRACKING
6/18/2019

D-K-5716

Instance Count by Family Na...



Model Name

☐ Select all

☐ MWH04-MECH-ELEC_CX_TRAC...

☐ MWH05-MECH-ELEC_CX_TRAC...

Category Name

☐ Select all

☐ Electrical Equipment

☐ Mechanical Equipment

Family Name

All

Filter by Model Property

Total MECH-ELEC Equip Counts

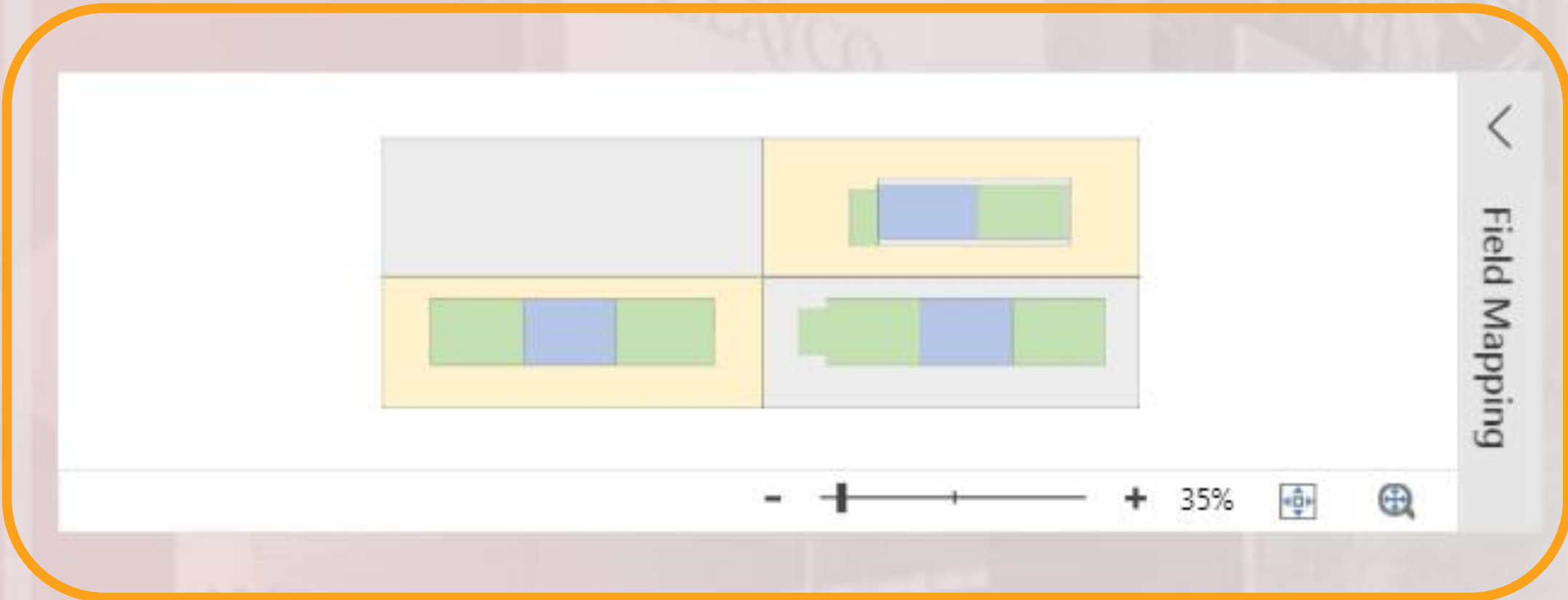
7087

Installation Status

- ☐ Select all
- ☐ (Blank)
- ☐ Delivered
- ☐ Level 1 CX
- ☐ Level 2 CX
- ☐ Level 3 CX

You are looking at Zone:

MWH04N-ADMIN



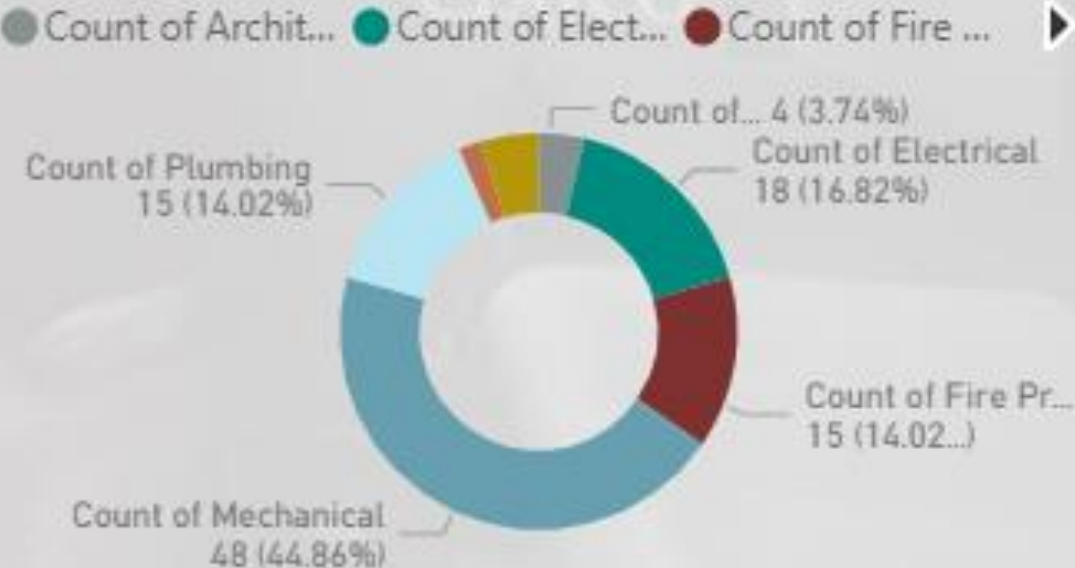
4 Levels (Conditional Formatting)

Installation Status	Instance Count	%GT Instance Count	VDC Status...
	6282	88.64%	0
Delivered	364	5.14%	90
Level 1 CX	433	6.11%	10
Level 2 CX	3	0.04%	20
Level 3 CX	5	0.07%	30
Total	7087	100.00%	

CX Installation List

Source Id	Category Name	Family and Type	Installation St...	#01 - Ca...	#02 - Project #	#03-F...	#04-Fo...	#05-S...	#06-S...	#07-Equ...	#08-...	#09-Eq...
431564	Mechanical Equipment	10 kW	Level 3 CX	MWH04	14532	023	COLO3	CELL	A	FC		1
432032	Mechanical Equipment	10 kW	Level 3 CX	MWH05	14532	021	COLO1	CELL	B	FC		2
443012	Mechanical Equipment	Left Hand	Level 3 CX	MWH04	14532	022	COLO2	CELL	D	AHU		7
432031	Mechanical Equipment	10 kW	Level 2 CX	MWH05	14532	021	COLO1	CELL	B	FC		1
502097	Electrical Equipment	3MW	Level 2 CX	MWH04	14532	22	COLO2	CELL	D	GENPAC		01
1058338	Mechanical Equipment	4"-14"	Level 1 CX	MWH04			ADMIN1			VAV	2	
1058414	Mechanical Equipment	4"-14"	Level 1 CX	MWH04			ADMIN1			VAV	8	
1058426	Mechanical Equipment	4"-14"	Level 1 CX	MWH04			ADMIN1			VAV	9	
1058447	Mechanical Equipment	4"-14"	Level 1 CX	MWH04			ADMIN1			VAV	10	
1058453	Mechanical Equipment	4"-14"	Level 1 CX	MWH04			ADMIN1			VAV	11	

Issues by Disciplines



4 Levels (Conditional Formatting)

Front end DAX method_%GT Instance Count

Background color - %GT Instance Count

Format by Rules [Learn more](#)

Based on field

Average of VDC Index Column for Installation

Summarization

Average

Rules

+ Add

If value	is	9	then		↑	↓	×
If value	is	0	then		↑	↓	×
If value	is	1	then		↑	↓	×
If value	is	2	then		↑	↓	×
If value	is	3	then		↑	↓	×

Installation Status	Instance Count	%GT Instance Count	VDC Status Tracking Back End
	6282	88.64%	0
Delivered	364	5.14%	90
Level 1 CX	433	6.11%	10
Level 2 CX	3	0.04%	20
Level 3 CX	5	0.07%	30
Total	7087	100.00%	

Values

Installation Status
Instance Count
%GT Instance Count
VDC Status Tracking Back End

Filters

- ☐ Task Name
- ☐ Σ Total Cost
- ☐ Type Name
- ☐ Type Properties
- ☐ Unit
- ☐ Σ Unit Cost
- ☐ VDC Index Column for Installation Status
- ☒ Σ VDC Status Tracking Back End

4 Levels (Conditional Formatting)

Back end M Language method_VDC Status Tracking Back End

"Added Conditional Column" = Table.AddColumn("#Changed Type1", "VDC Status Tracking Back End", each if [Installation Status] = "Delivered" then 90 else if [Installation Status] = null then 0 else if [Installation Status] = "Level 1 CX" then 10 else if [Installation Status] = "Level 2 CX" then 20 else if [Installation Status] = "Level 3 CX" then 30 else null)

Queries [20]

Functions [4]

GetProjects

GetIssues

Model Version

GetIssueLoop

AuthToken [1]

AuthToken (efa535c998089572a02c89...

Other Queries [15]

Site Sub-Domain (clayco)

Project Name (...)

_Measures

Project

Model

Grid Data

Selected Project

Available Properties

Selected Properties

Selected Properties Json

HubID

Projects

Issues

Disciplines

Assemble_BIMTrack (2)

Close & Apply

New Source

Recent Sources

Enter Data

Data source settings

Manage Parameters

Refresh Preview

Properties

Advanced Editor

Manage

Choose Columns

Remove Columns

Keep Rows

Remove Rows

Sort

Split Column

Group By

Data Type: Text

Use First Row as Headers

Replace Values

Merge Queries

Append Queries

Combine Files

Table.AddColumn("#Changed Type1", "VDC Status Tracking Back End", each if [Installation Status] = "Delivered" then 90 else

ABC 123 BidPackage_AssembleProperty::string

ABC 123 Assembly Code

ABC 123 Source Id

ABC 123 Custom

ABC 123 VDC Status Tracking Back End

1	null	null	543958	null	0
---	------	------	--------	------	---

Add Conditional Column

Add a conditional column that is computed from the other columns or values.

New column name

VDC Status Tracking Back End

	Column Name	Operator	Value	Output
If	Installation Status	equals	Delivered	90
Else If	Installation Status	equals	null	0
Else If	Installation Status	equals	Level 1 CX	10
Else If	Installation Status	equals	Level 2 CX	20
Else If	Installation Status	equals	Level 3 CX	30

Add rule

Else

null

OK

Cancel

Query Settings

PROPERTIES

Name

Grid Data

All Properties

APPLIED STEPS

Source

Navigation

Added Custom

Filtered Rows

Changed Type

Cleaned Text

Trimmed Text

Cleaned Text1

Trimmed Text1

Cleaned Text2

Trimmed Text2

Cleaned Text3

Trimmed Text3

Changed Type1

Added Conditional Column

4 Levels (Conditional Formatting)

Back end M Language method_VDC Status Tracking Back End

Background color - *VDC Status Tracking Back End*

Format by

Rules ▼

[Learn more](#)

Based on field

Average of VDC Status Tracking Back End ▼

Summarization

Average ▼

Rules

+ Add

If value	is ▼	0		then	<div>■ ▼</div>		↑	↓	×
If value	is ▼	90		then	<div>■ ▼</div>		↑	↓	×
If value	is ▼	10		then	<div>■ ▼</div>		↑	↓	×
If value	is ▼	20		then	<div>■ ▼</div>		↑	↓	×
If value	is ▼	30		then	<div>■ ▼</div>		↑	↓	×

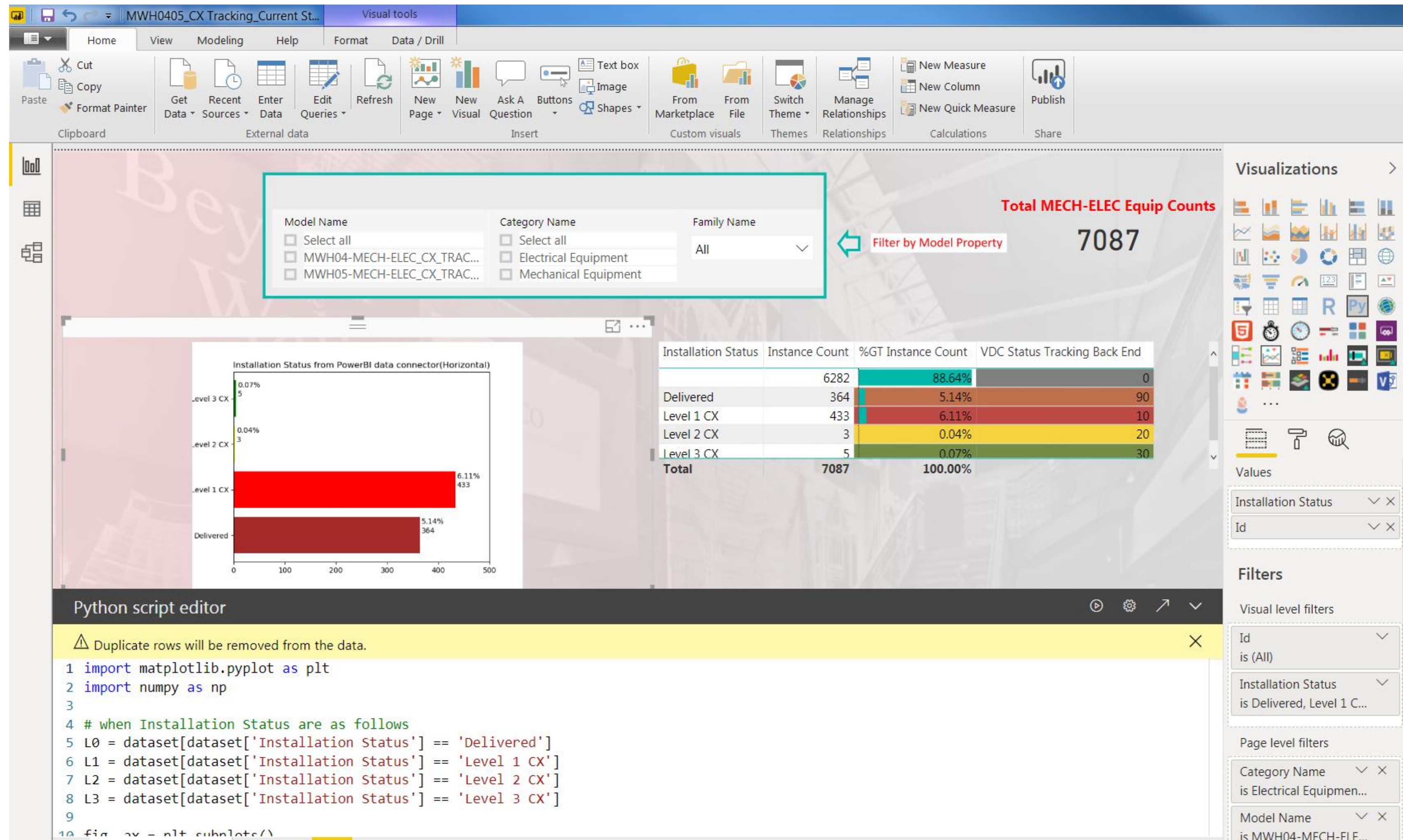
4 Levels (Conditional Formatting)

Back end M Language method_VDC Status Tracking Back End

- M - language used in PowerQuery in Excel
- DAX - VBA in Excel

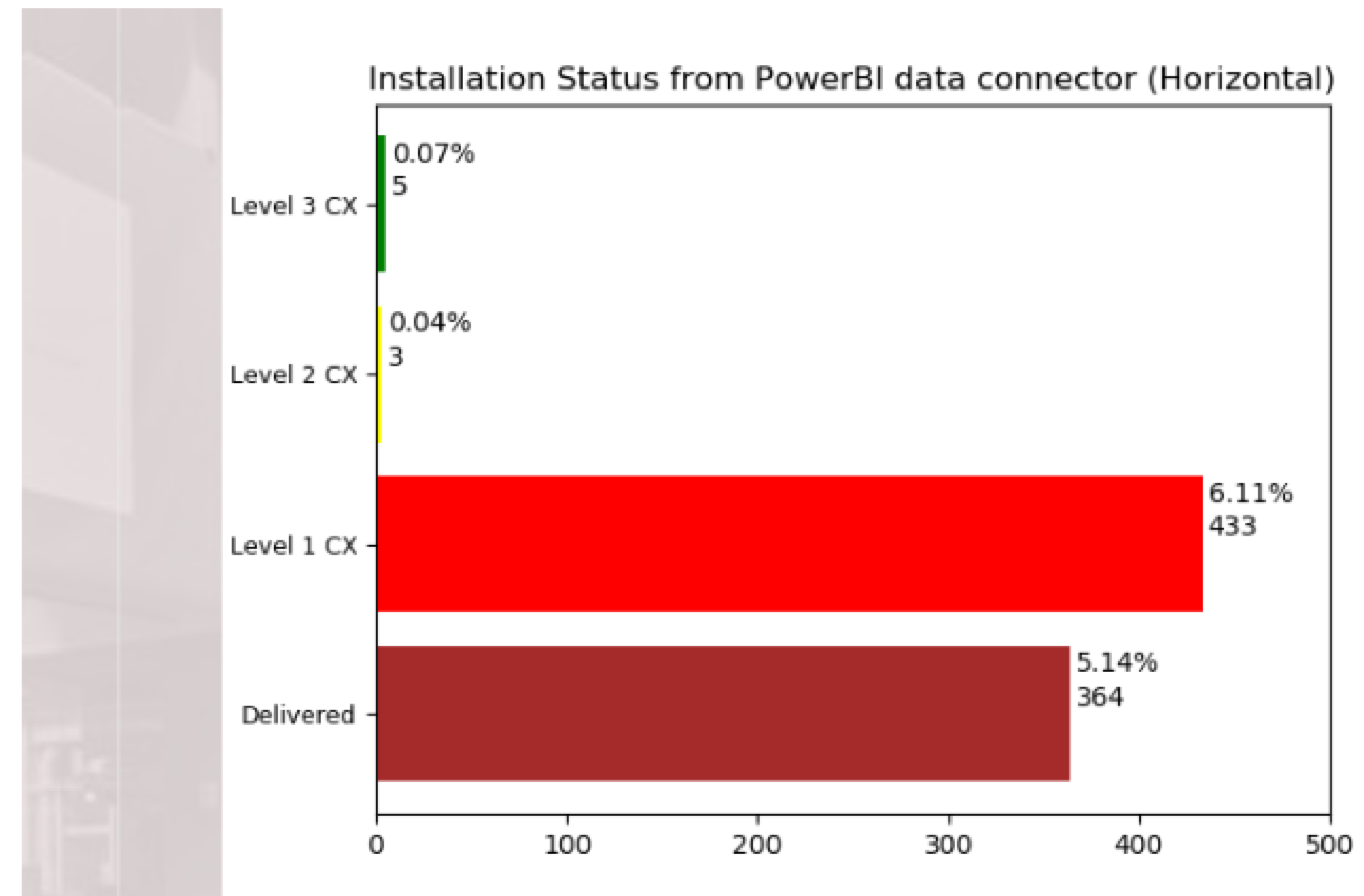
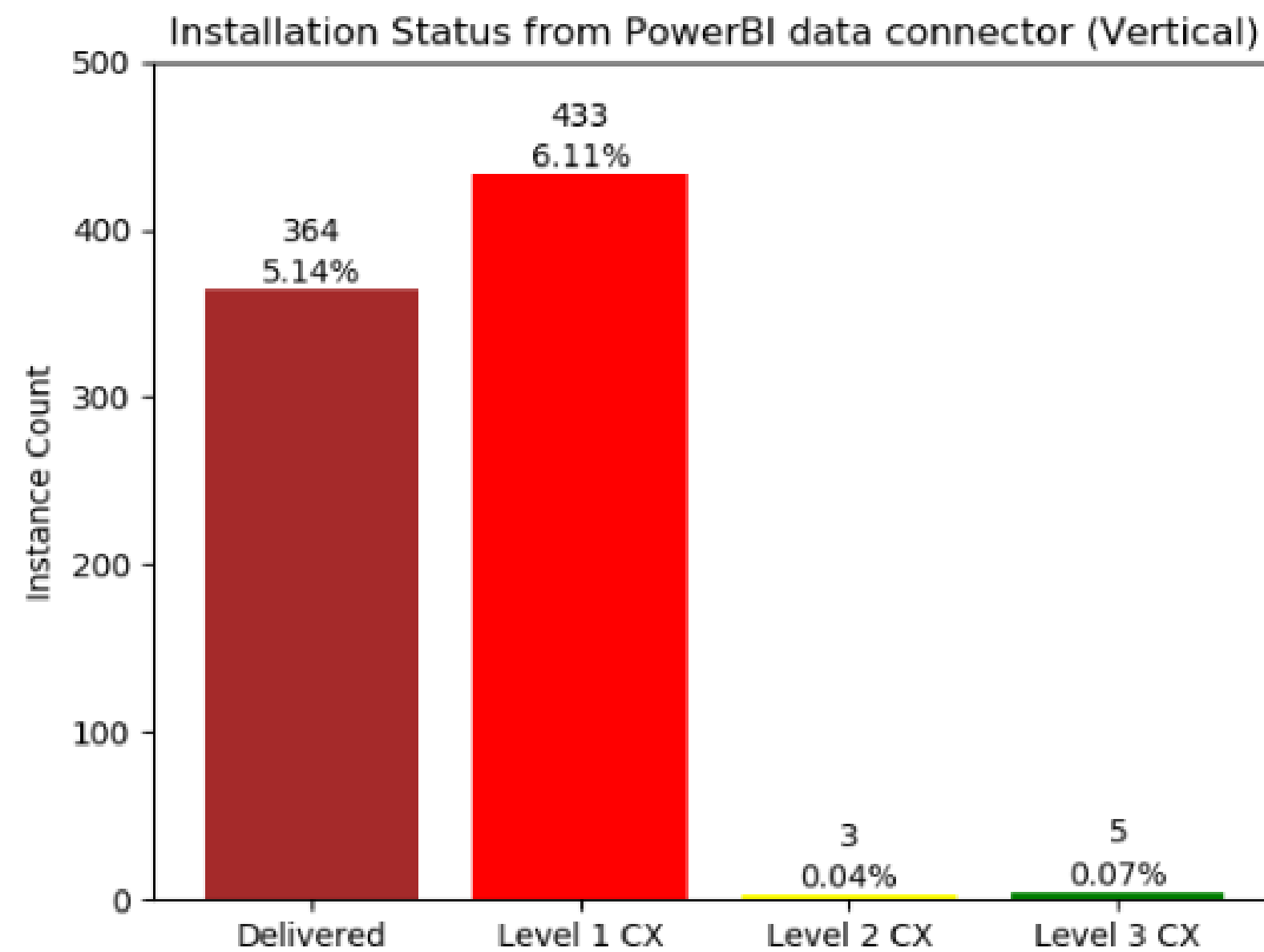
4 Levels (Conditional Formatting)

Python Scripts



4 Levels (Conditional Formatting)

Back end M Language method_VDC Status Tracking Back End



The following code to create a dataframe and remove duplicated rows is always executed and acts as a preamble for your script:

```
# dataset = pandas.DataFrame(Instance Count, Id)
# dataset = dataset.drop_duplicates()
```

Paste or type your script code here:

```
import matplotlib.pyplot as plt
import numpy as np
```

when Installation Status are as follows

```
L0 = dataset[dataset['Installation Status'] == 'Delivered']
L1 = dataset[dataset['Installation Status'] == 'Level 1 CX']
L2 = dataset[dataset['Installation Status'] == 'Level 2 CX']
L3 = dataset[dataset['Installation Status'] == 'Level 3 CX']
```

```
fig, ax = plt.subplots()
```

```
objects = ('Delivered', 'Level 1 CX', 'Level 2 CX', 'Level 3 CX')
y_pos = np.arange(len(objects))
lengths = [len(L0), len(L1), len(L2), len(L3)]
```

```
rects1 = plt.bar(y_pos, lengths, align='center', alpha=1, color=['brown', 'red', 'yellow', 'green'])
axes = plt.gca()
axes.set_ylim([0,500])
plt.xticks(y_pos, objects)
plt.ylabel('Instance Count')
plt.title('Installation Status from PowerBI data connector (Vertical)')
```

```
for rect in rects1:
    height = rect.get_height()
    ax.text(rect.get_x() + rect.get_width()/2., 1.0*height,
            str(round((height/7087)*100,2)) + str("%"), ha='center', va='bottom')
```

```
for rect in rects1:
    height = rect.get_height()
    ax.text(rect.get_x() + rect.get_width()/2., 25
            + height,
            str(height), ha='center', va='bottom')
```

```
plt.show()
```

```
import matplotlib.pyplot as plt
import numpy as np
```

when Installation Status are as follows

```
L0 = dataset[dataset['Installation Status'] == 'Delivered']
L1 = dataset[dataset['Installation Status'] == 'Level 1 CX']
L2 = dataset[dataset['Installation Status'] == 'Level 2 CX']
L3 = dataset[dataset['Installation Status'] == 'Level 3 CX']
```

```
fig, ax = plt.subplots()
```

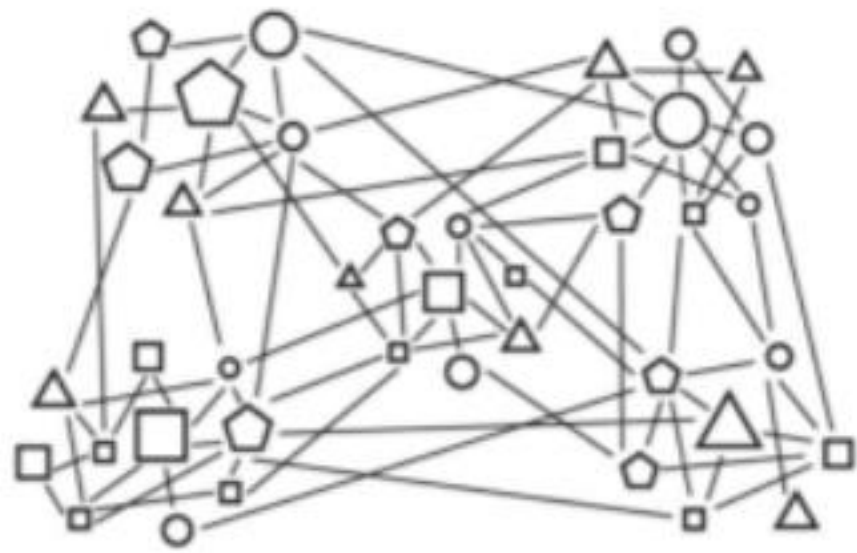
```
objects = ('Delivered', 'Level 1 CX', 'Level 2 CX', 'Level 3 CX')
lengths = [len(L0), len(L1), len(L2), len(L3)]
```

```
rects1 = plt.barh(objects, width=lengths, align='center', alpha=1, color=['brown', 'red', 'yellow', 'green'])
axes = plt.gca()
ax.set_yticks(objects)
ax.tick_params(axis='y',labelsize = 9)
axes.set_xlim([0,500])
```

```
plt.title('Installation Status from PowerBI data connector (Horizontal)')
```

```
for i, v in enumerate(lengths):
    ax.text(v + 3, i + .25, str(round((v/7087)*100,2)) + str("%"))
    ax.text(v + 3, i + .05, str(v))
```

```
plt.show()
```



BIM Track Structure
BIM Track API Structure
BIM Track in Power BI
(M Language)
Disciplines (DAX)

Zones

Element ID
SQL
PowerApp

BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code
Assemble: Tracking Rooms Installation-Scanning Bar Code
P6 and Assemble Schedule Integrator
Model Mashups: Design Iterations and Design vs Construction
Power BI Data Connector

Installation Status
Tracking

4 Levels
(Conditional
Formatting)

Front end: DAX
Back end: M Language
Python Scripts

2 Levels
(Binary)

Installed Or Not
Forecasting





100 Kingshighway St. Louis, MO

- 36-story, 316-unit luxury apartment tower
 - 185 parking garage capacity
 - Will be St. Louis's tallest residential building
- Glass façade for natural lighting and sweeping views
- Team includes:
 - Designer - **Studio Gang**
 - Glass/Windows - **Ventana** (Clayco's subsidiary)
 - Concrete - **Concrete Strategies** (Clayco subsidiary)

2 Levels (Binary)

Installed or Not



2 Levels (Binary)

Forecasting

View

Modeling

Help

Format

Data / Drill

Get Data

Recent Sources

Enter Data

Edit Queries

Refresh

New Page

New Visual

Ask A Question

Buttons

Image

Text box

Shapes

From Marketplace

From File

Switch Theme

Manage Relationships

New Measure

New Column

New Quick Measure

Publish

External data

Insert

Custom visuals

Themes

Relationships

Calculations

Share

1 Instance Count running total in VDC_Installation_Date =

2 CALCULATE(

3 SUM('Grid Data'[Instance Count]),

4 FILTER(

5 ALLSELECTED('Grid Data'[VDC_Installation_Date]),

6 ISONORAFTER('Grid Data'[VDC_Installation_Date], MAX('Grid Data'[VDC_Installation_Date]), DESC)

7)

8)

Quick measures

Calculation

Select a calculation

Quarter-to-date total

Month-to-date total

Year-over-year change

Quarter-over-quarter change

Month-over-month change

Rolling average

Totals

Running total

Total for category (filters applied)

Total for category (filters not applied)

Mathematical operations

Addition

Subtraction

Multiplication

Division

Percentage difference

Correlation coefficient

Text

Star rating

Concatenated list of values

Fields

Search

_Measures

Available Properties

Grid Data

Images

LastRefresh

Model

Model Version

Project

Visualizations

Axis

VDC_Installation_Date

Legend

Add data fields here

Values

Instance Count running total in VDC_In

Tooltips

Add data fields here

Filters

Visual level filters

Instance Count running total in VDC_In

is (All)

VDC_Installation_Date

is not (Blank)

Fields

Search

_Measures

% Assigned Assembly Code

% Assigned Bid Package

% Assigned Unit Cost

Assembly Code Count

Bid Package Count

Compared Models

Count

Count Difference

Current Count

Current Version

Installation Running Total_Fixed

Installed Running Total

Instance Count running total in VDC_In

Previous Count

Previous Version

Project

Quantity

Quantity Current

Quantity Difference

Quantity Previous

Row Count

Running Total

Total Cost Current

Total Cost Difference

67

144

249

42

Jun 2019

ALLIED

NOT INSTALLED

LEVEL_08

LEVEL_09

LEVEL_10

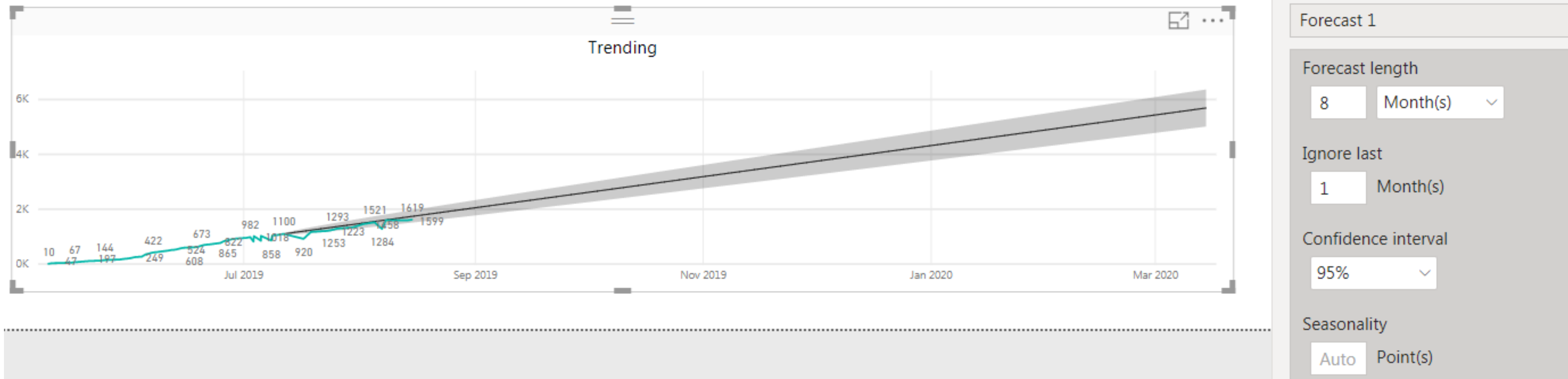
LEVEL_11

LEVEL_12

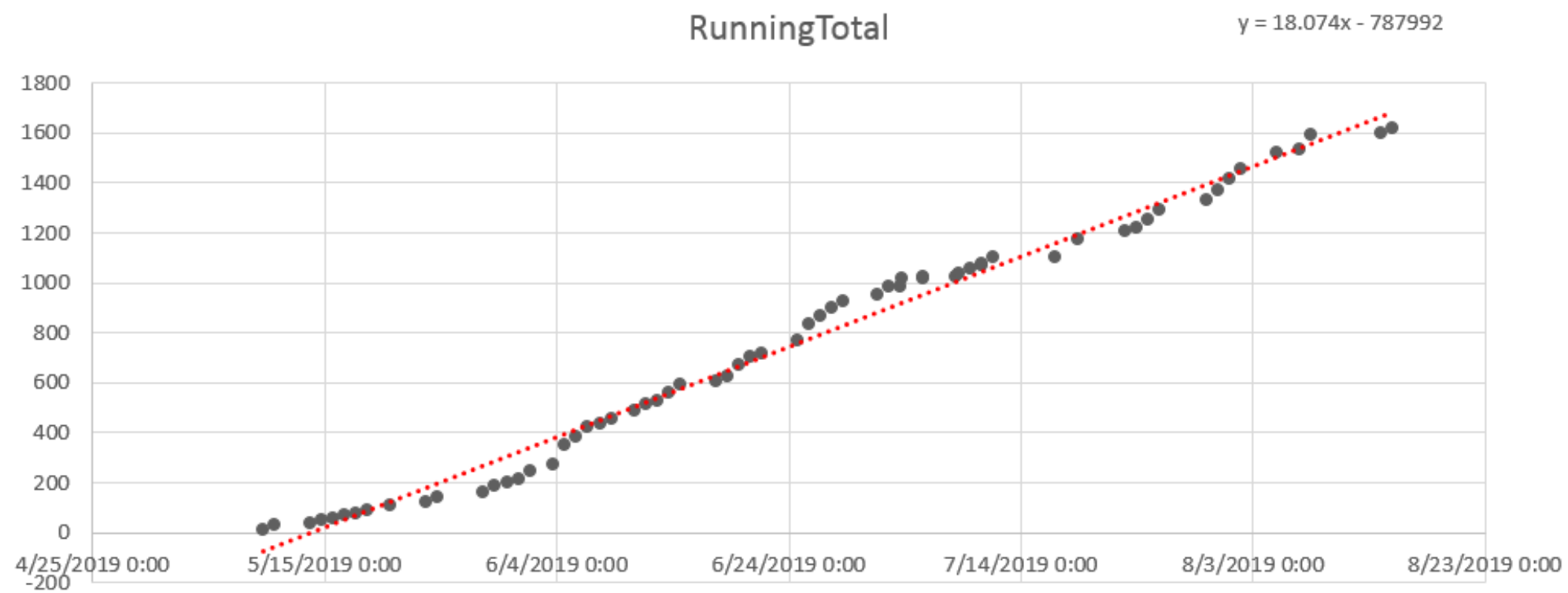
e 1

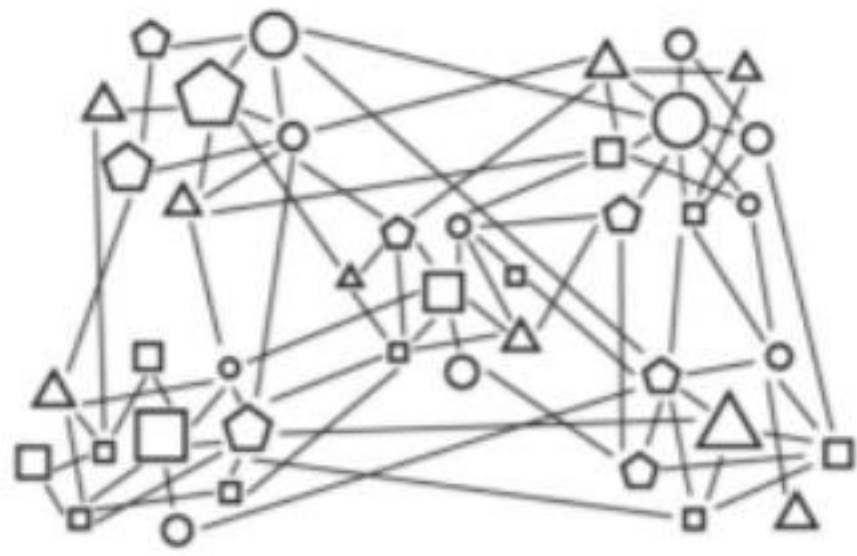
2 Levels (Binary)

Forecasting



Error (Per cent)	VDC_Installation_Date	RunningTotal	Forecast	Slope	Intercept
712.42	5/9/2019 17:00	10	-61.24158333	18.074	-787992
239.25	5/10/2019 17:00	31	-43.16758333		
71.66	5/13/2019 17:00	39	11.05441667		
41.74	5/14/2019 17:00	50	29.12841667		
12.59	5/15/2019 17:00	54	47.20241667	3/11/2020	5477
2.57	5/16/2019 17:00	67	65.27641667		
9.67	5/17/2019 17:00	76	83.35041667		
13.96	5/18/2019 17:00	89	101.4244167		
25.07	5/20/2019 17:00	110	137.5724167		
54.67	5/23/2019 17:00	124	191.7944167		
45.74	5/24/2019 17:00	144	209.8684167		
72.05	5/28/2019 17:00	164	282.1644167		
63.17	5/29/2019 17:00	184	300.2384167		
61.58	5/30/2019 17:00	197	318.3124167		
55.73	5/31/2019 17:00	216	336.3864167		
42.35	6/1/2019 17:00	249	354.4604167		
43.61	6/3/2019 17:00	272	390.6084167		
17.10	6/4/2019 17:00	349	408.6824167		
10.85	6/5/2019 17:00	385	426.7564167		
5.41	6/6/2019 17:00	422	444.8304167		
6.41	6/7/2019 17:00	435	462.9044167		
5.71	6/8/2019 17:00	455	480.9784167		





BIM Track Structure
BIM Track API Structure
BIM Track in Power BI
(M Language)
Disciplines (DAX)

Zones

Element ID

SQL
PowerApp

BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code
Assemble: Tracking Rooms Installation-Scanning Bar Code
P6 and Assemble Schedule Integrator
Model Mashups: Design Iterations and Design vs Construction
Power BI Data Connector

Installation Status Tracking

4 Levels
(Conditional
Formatting)

Front end: DAX
Back end: M Language
Python Scripts

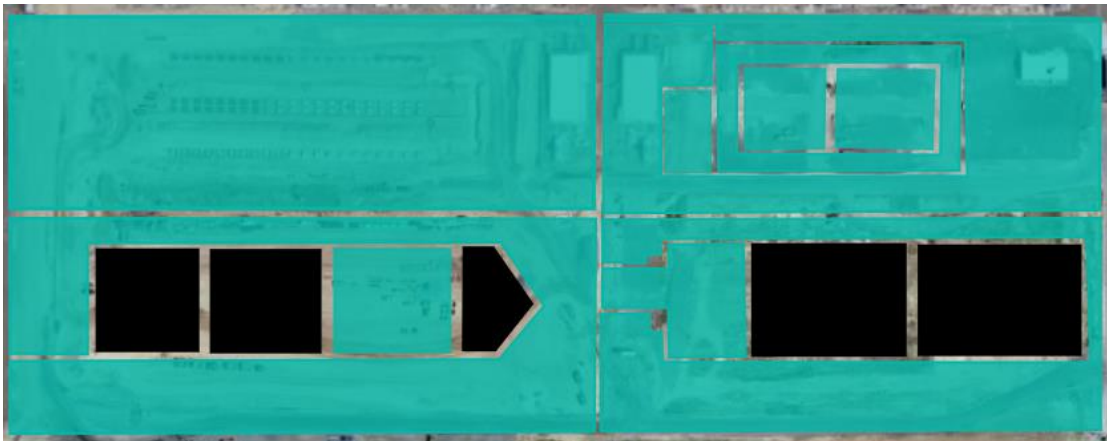
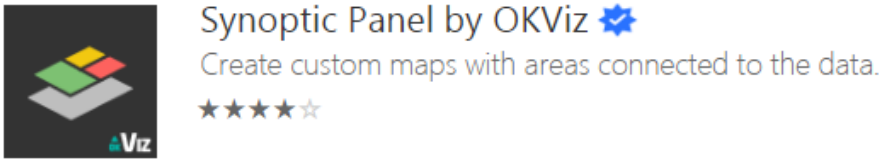
2 Levels
(Binary)

Installed Or Not
Forecasting

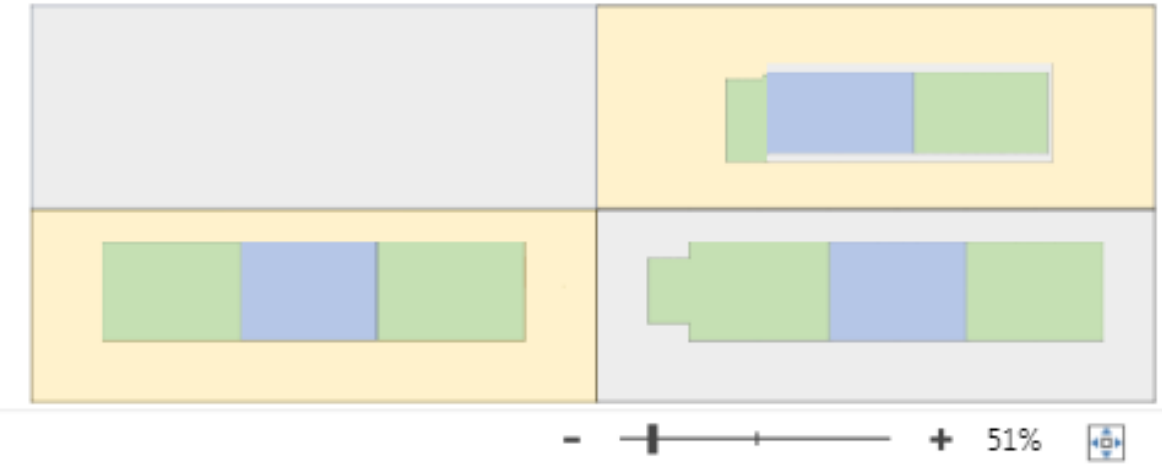


Zones

Inscape-Synoptic Panel by OKViz



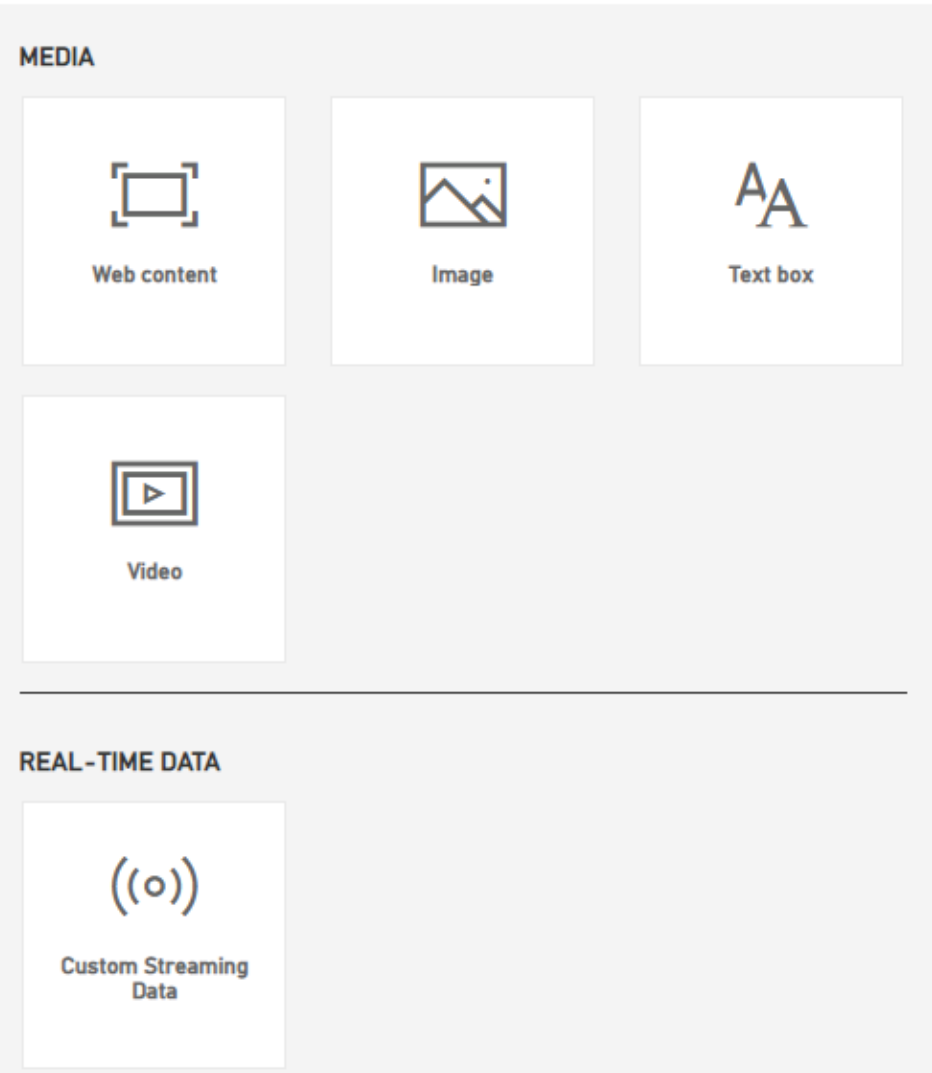
Geo-location coordinates from Revit



Rendered 3D model in BI Report

Add tile

Select source



Zones

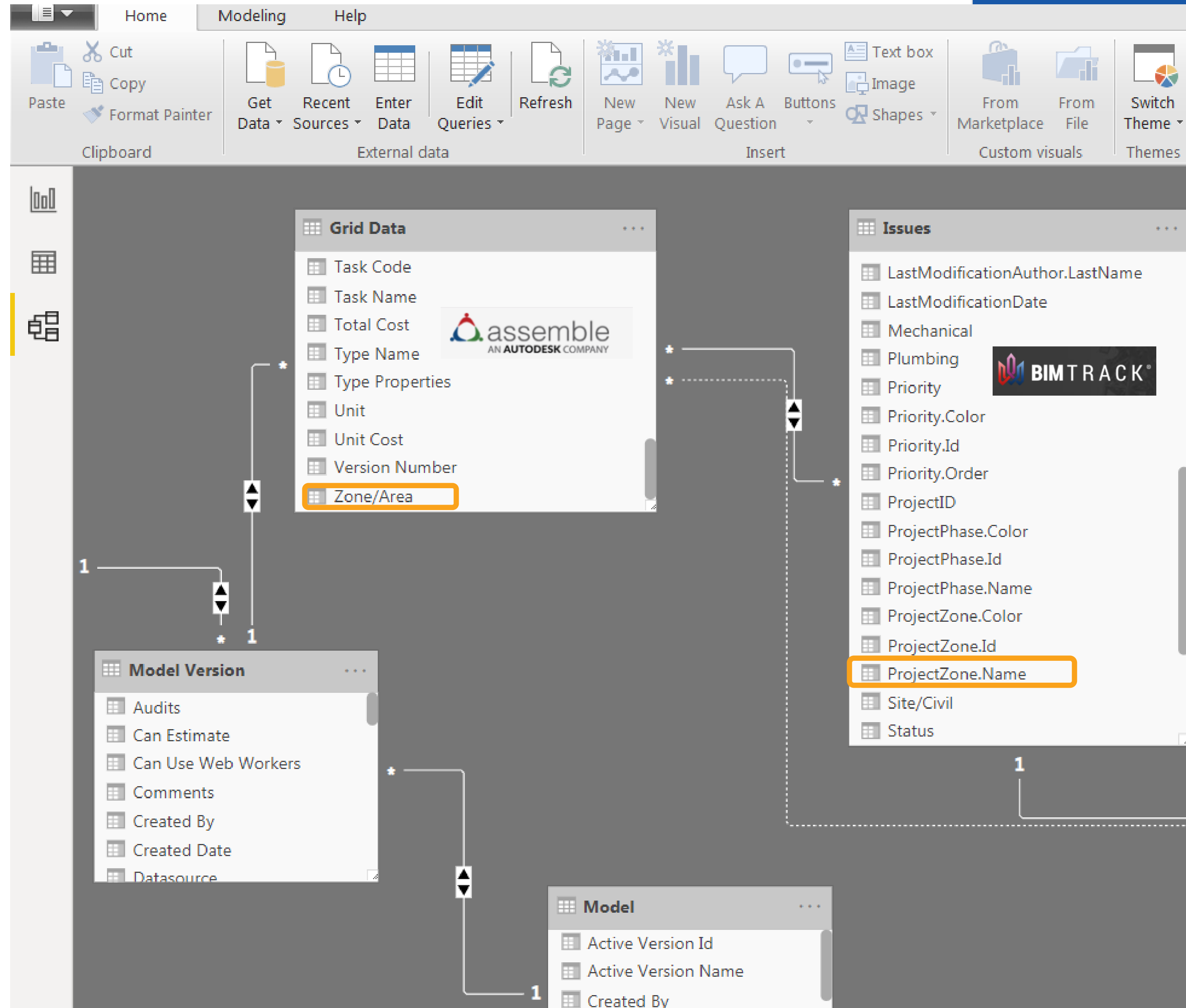
Your first dashboard

This tutorial will guide you reading data and creating some charts.

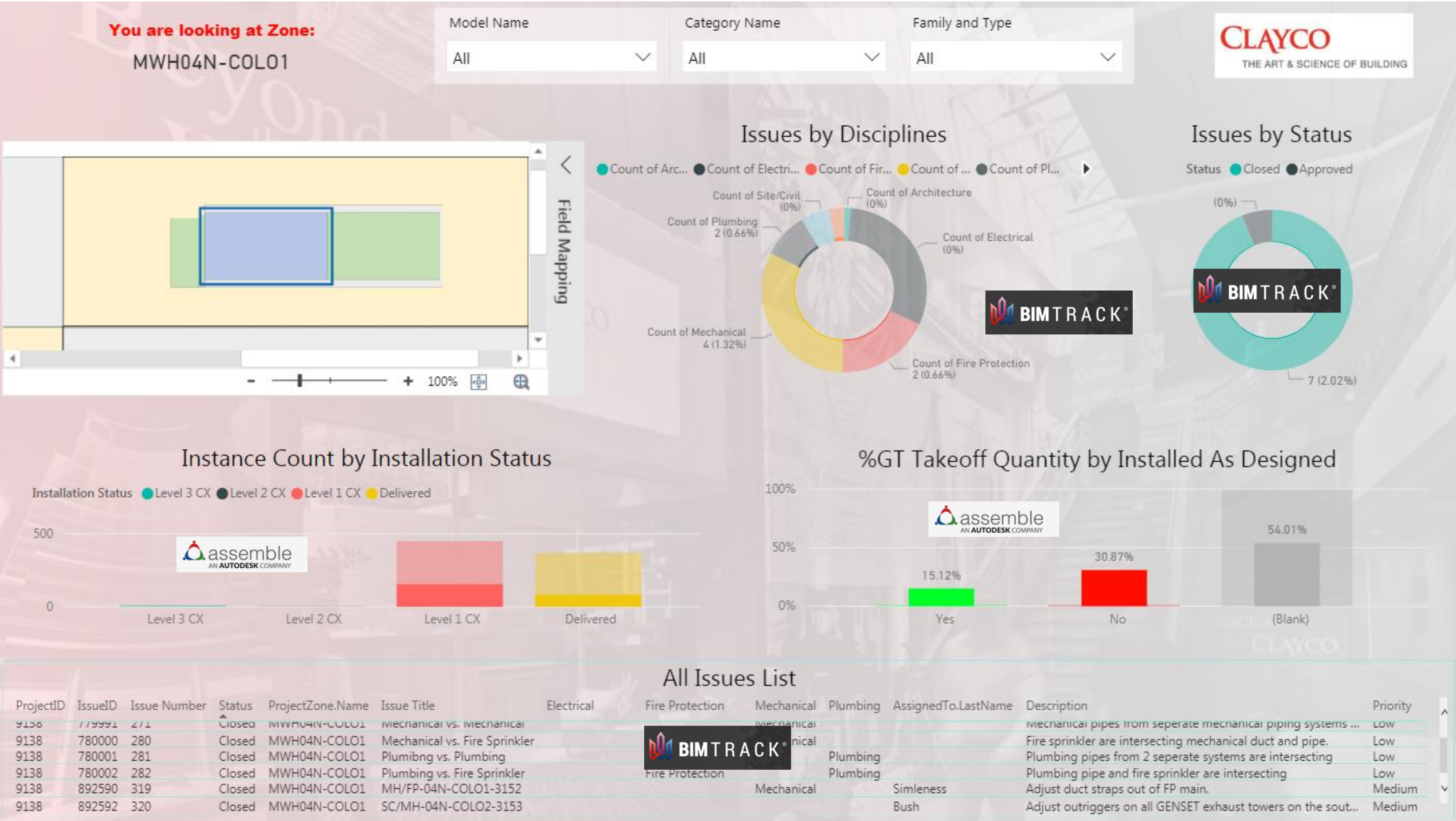


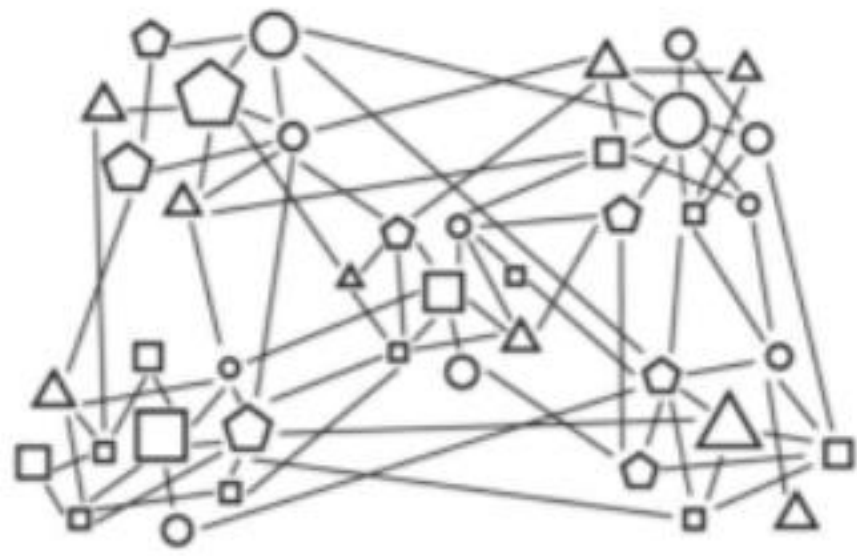
<https://forge.autodesk.com/>

Zones



For a specific COLO, if the installation status is shown 100% while there are still active issues, then it indicates site installation is not following BIM coordination.





BIM Track Structure
BIM Track API Structure
BIM Track in Power BI
(M Language)
Disciplines (DAX)

Zones

Element ID
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Installation Status Tracking

4 Levels
(Conditional
Formatting)

Front end: DAX
Back end: M Language
Python Scripts

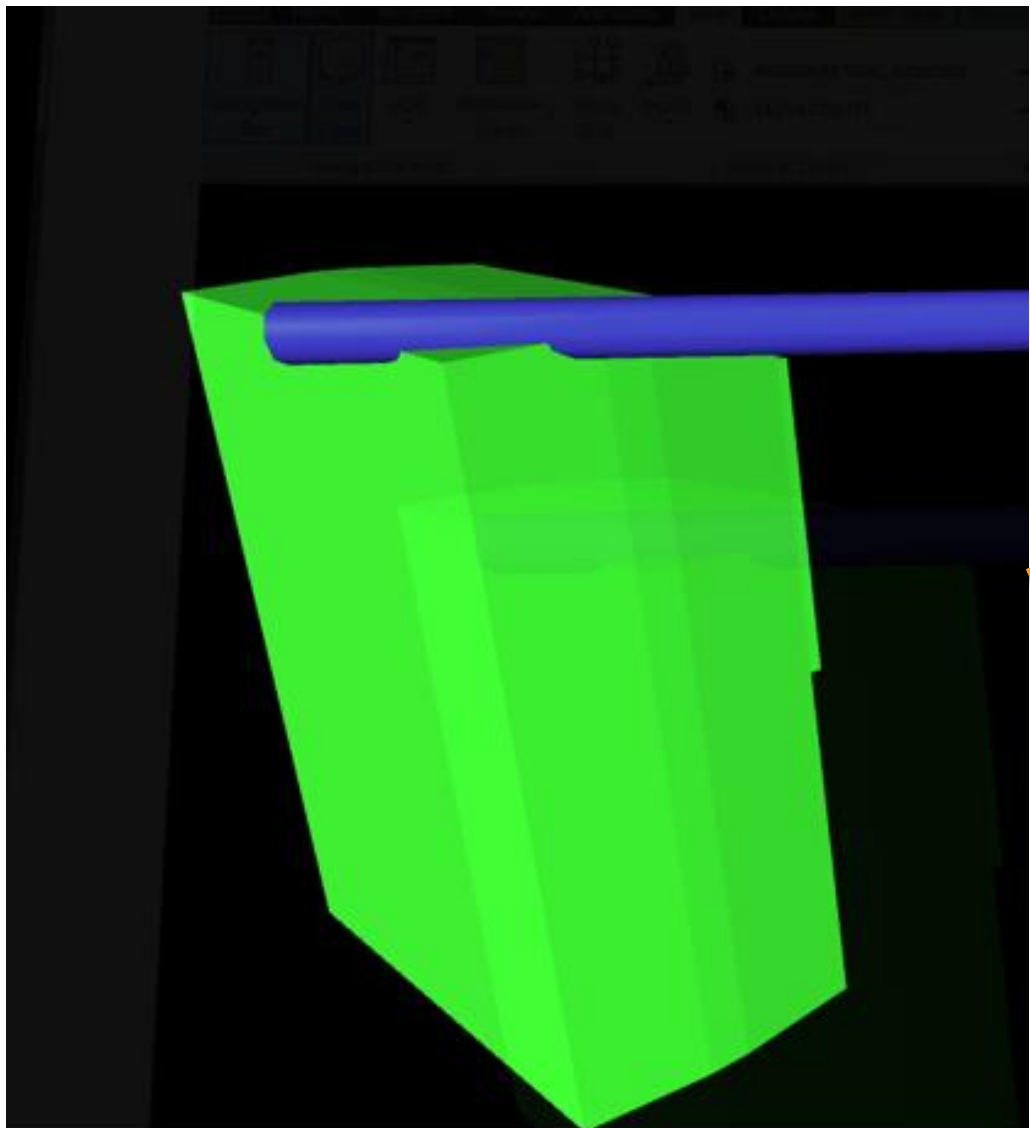
2 Levels
(Binary)

Installed Or Not
Forecasting



Element ID

Link Dimensions



Start Date	4/12/2019	▼
Finish Date	4/12/2019	▼
Act Start Date	4/13/2019	▼
Act Finish Date	4/13/2019	▼

Installation Status

☐ Select all

☐ (Blank)

☐ Delivered

☐ Level 1 CX

☐ Level 2 CX

☐ Level 3 CX

Description	Size	Unit	Man-hours Norm	Productivity Factor	Project Man-hours Rate
Rigid Steel Conduit	1/2"	If	0.045	1.200	0.054
Rigid Steel Conduit	3/4"	If	0.050	1.200	0.060
Rigid Steel Conduit	1"	If	0.055	1.200	0.066

Another Dimension

Element ID

Autodesk Navisworks Manage 2018 (For BIM360) 215_FED_ALL_ALL

Home Viewpoint Review Animation View Output Sectioning Tools BIM 360 Render BIMcollab Navis

Open BIM Track™ Group Clashes Show/Hide Clashes Show/Hide Views Create Selection Box Settings Help

BIM Track™

Update Available ! LIANG GONG | Logout

clayco Clashes to Issues

10103648 215 Peoria

Create Issues from Clashes

Clash test	Clashes	New	Active	Reviewed	Approved	Resolved	Last run
01 - MEPFP vs. MEPFP	38	0	23	0	2	13	9/6/2019 9:35:59 AM
01 - MEPFP vs. STRUC	4	0	0	0	4	0	9/6/2019 9:35:59 AM
02 - MEPFP vs. MEPFP	12	0	6	0	0	6	9/6/2019 9:35:59 AM
02 - MEPFP vs. STRUC	39	0	18	0	0	21	9/6/2019 9:35:59 AM
03 - MEPFP vs. MEPFP	2	0	0	0	0	2	9/6/2019 9:35:59 AM
03 - MEPFP vs. STRUC	53	0	45	0	0	8	9/6/2019 9:35:59 AM
04 - MEPFP vs. MEPFP	21	0	20	0	0	1	9/6/2019 9:35:59 AM
04 - MEPFP vs. STRUC	51	0	42	0	0	9	9/6/2019 9:35:59 AM

☒ Update BIM Track status for new and existing clashes ⓘ

☒ Do not create new issue(s) for Approved and Resolved clash(es)

☐ Automatically fill the Group field with the clash test name

Clash properties that will be included in the description:

- ☐ Date Found
- ☐ Assigned To
- ☐ Date Approved
- ☐ Approved By
- ☐ Layer Name
- ☐ Item Path
- ☐ Status
- ☐ Distance
- ☐ Description
- ☐ Quick Properties
- ☐ Clash Group
- ☐ Grid Location

Clash Status to Export

- ☐ New
- ☐ Active
- ☐ Reviewed
- ☐ Approved
- ☐ Resolved

Autodesk Navisworks Manage 2018 (For BIM360) 215_FED_ALL_ALL

Home Viewpoint Review Animation View Output Item Tools Sectioning Tools BIM 360 Render BIMcollab Navistools IFC BIM

Navigation Bar View Cube HUD Reference Views Show Grid Mode 60103648-VDC_detached ELEVATOR PIT Full Screen Split View

Navigation Aids Grids & Levels Scene

Properties

Item	Material	Revit Material	Autodesk Material
Value	3253638		

Selection Tree

Standard

- 215_HUEN_ELEC_L03_ALL
 - <No level>
 - LEVEL 02
 - Center line
 - Conduit Fittings
 - Conduits
 - Conduit without Fittings
 - (EMT) 0he-277/480 NORM
 - (RMC) 0he-277/480 EM-LS
 - (RMC) 0he-277/480 NORM
 - (EMT) 0he-277/480 EM-LS
 - (RMC) 0he-120/208 NORM
 - (EMT) 0he-LV
 - (EMT) 0he-GRND
 - Conduit without Fittings
 - Conduit without Fittings
 - Conduit without Fittings
 - Conduit without Fittings
 - Conduit without Fittings
 - (EMT) 0he-120/208 NORM
 - (EMT) 0he-120/208 EM-LS

Element ID

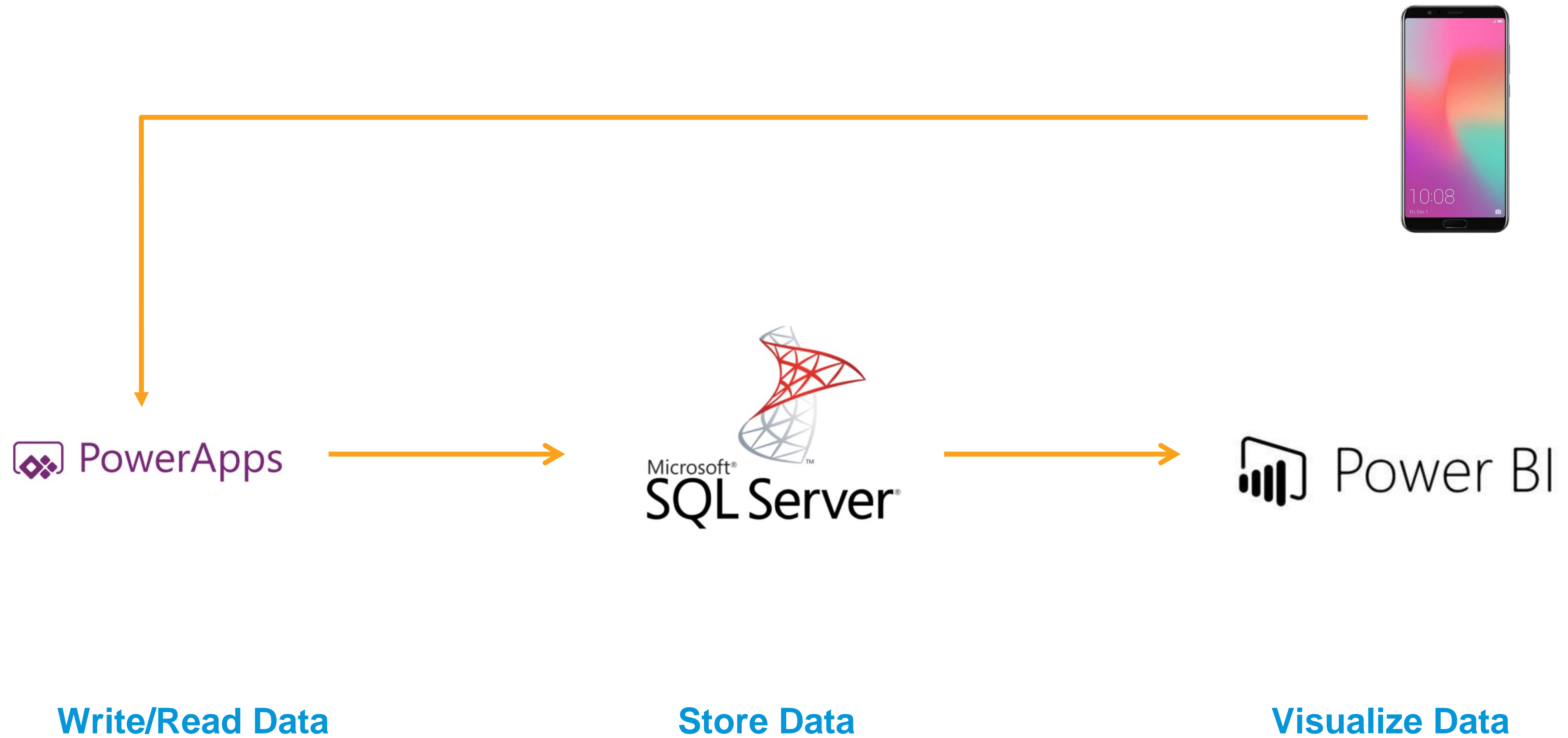
SQL
PowerApp



ProjectID	IssueID	Source_ID	Issue Number	Issue Title
9138	619776	5771124	1	001 P-TI
9138	619776	5771123	1	001 P-TI
9138	619776	5045498	1	001 P-TI
9138	1014090		333	SC/ARCH-05-ADMIN-3172
9138	1014091		334	SC-05-ADMIN-3173
9138	1014092		335	FP/EC-05-COLO1-3174
9138	1014093		336	MP/SC-05-COLO3-3175
9138	1014094		337	MP/SC-05-COLO2-3176
9138	1014095		338	EC/MP-05-COLO1-3177
9138	1014096		339	MP/FP-05-COLO1-3178
9138	1014097		340	EC/MP-05-COLO2-3179



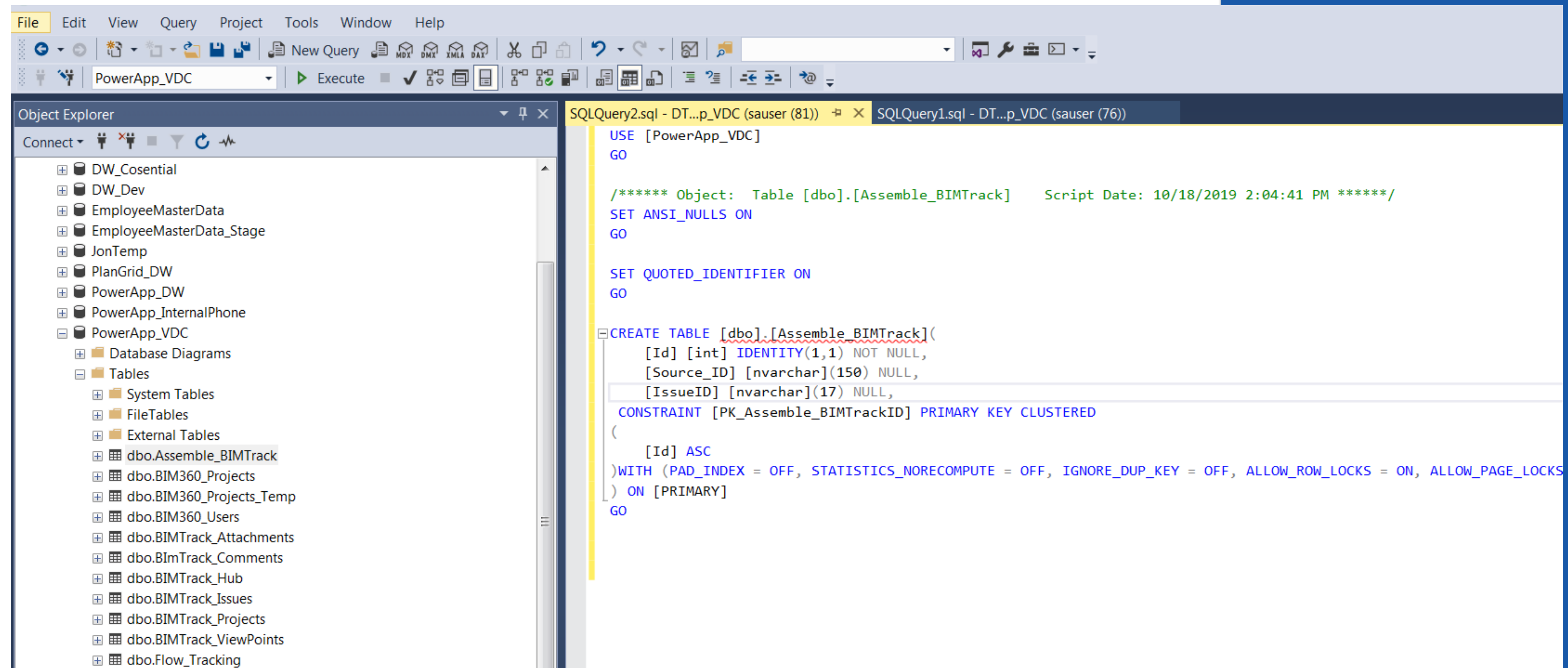
Element ID



Element ID

SQL
PowerApp

Set up SQL table for PowerApp and Powerb BI. You can insert, delete rows directly in SQL
Table: Assemble_BIM Track is set up in SQL first and then import to BI



Element ID

100 %

Messages

(1 row affected)

Completion time: 2019-10-16T15:06:31.0383226-05:00

INSERT INTO ASSEMBLE_BIMTRACK (SOURCE_id, issueid) VALUES (42,43)

Results		Messages	
	Id	Source_ID	IssueID
1	2	5771124	6197...
2	3		
3	4	5771123	6197...
4	5	5045498	6197...
5	6	42	43

fx

= Source{[Schema="dbo",Item="Assemble_BIMTrack"]}[Data]

	Id	Source_ID	IssueID
1	2	5771124	619776
2	3		
3	4	5771123	619776
4	5	5045498	619776
5	6	42	43

Element ID

SQL
PowerApp

Pointing PowerApp to **Table: Assemble_BIM Track** in SQL

The screenshot displays the Microsoft PowerApps development environment. At the top, the 'PowerApps' logo and 'View' tab are visible. The top right shows the environment 'Clayco, Inc. (default) (orgb8e3a...)'. The main workspace shows a gallery titled 'Issues and Source ID's' with a search bar 'Search items'. The gallery contains three rows of data, each with a red background image and two columns of text: '619776' and a source ID. The left sidebar shows the 'Tree view' with a search bar and a list of controls: App, BrowseScreen1, Image1, BrowseGallery1, Rectangle11, SearchIcon1, TextSearchBox1, IconNewItem1, IconSortUpDown1, IconRefresh1, LblAppName1, RectQuickActionBar1_1, and RectQuickActionBar1. The right sidebar shows the 'Properties' pane for 'BrowseScreen1', with the 'Fill' property set to 'RGBA(255, 255, 255, 1)' and the 'Background image' set to 'clayco-lobby-red'. The 'Data' pane shows the data source '[dbo].[Assemble_BIMTrack]' from 'VDC SQL Server'.

PowerApps

Environment: Clayco, Inc. (default) (orgb8e3a...)

File Home Insert View Action

Data sources Media Collections Variables Advanced

Fill = $\text{RGBA}(255, 255, 255, 1)$

Tree view

Search

App

BrowseScreen1

Image1

BrowseGallery1

Rectangle11

SearchIcon1

TextSearchBox1

IconNewItem1

IconSortUpDown1

IconRefresh1

LblAppName1

RectQuickActionBar1_1

RectQuickActionBar1

Issues and Source ID's

Search items

619776
5045498

619776
5771123

619776
5771124

Data

Add data source

[dbo].[Assemble_BIMTrack]
VDC
SQL Server

SCREEN
BrowseScreen1

Properties

Fill

Background image: clayco-lobby-red

Image position: Fill

Element ID

Data input here in PowerApp  Inserting query in SQL

PowerApps

Environment
Clayco, Inc. (default) (orgb8e3a...)

File Home Insert View Action

Data sources Media Collections Variables Advanced

DataSource = fx '[dbo].[Assemble_BIMTrack]'

Tree view

Search

EditScreen1

- Button1
- Image1_3

EditForm1

- DataCard2
- DataCard1
 - StarVisible1
 - ErrorMessage1
 - DataCardValue1
 - DataCardKey1
- LblAppName3
- IconAccept1
- IconCancel1

CLAYCO
THE ART & SCIENCE OF BUILDING

Issue and Source ID - Edit/Create

IssueID

Source_ID

Barcode Scanner

EDIT
EditForm1

Properties

Advanced

Data source

[dbo].[Assemble_BI...

Fields

Edit fields

Snap to columns

On

Columns

1

Layout

Vertical

Default mode

Edit

Visible

On

Position

088

X

Y

Size

1136313

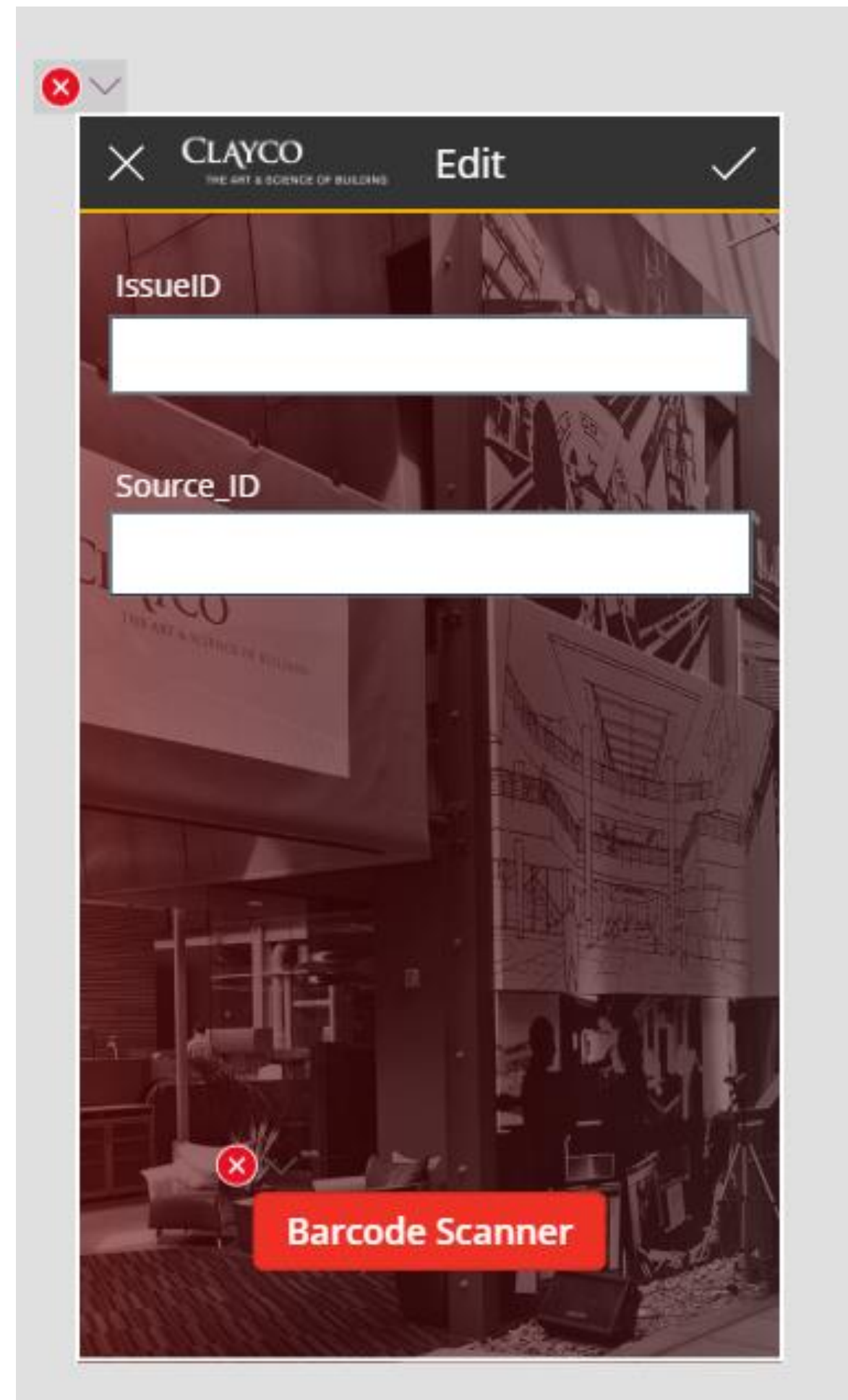
Width

Height

Color

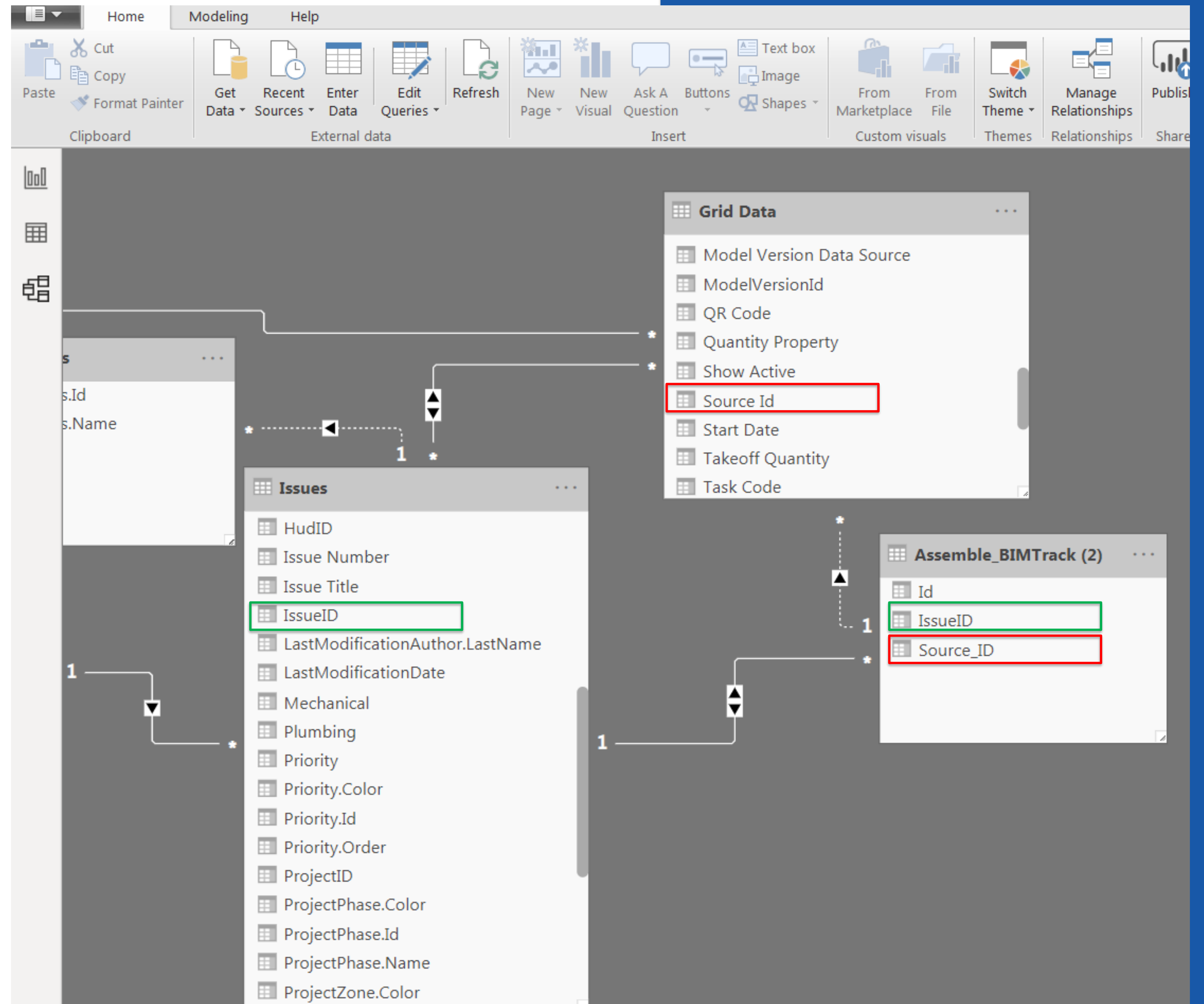
Element ID

Could use phone to scan code-Cell layout



Element ID

Link the Source_ID and IssueID in SQL table into existing Assemble and BIM Track tables



Element ID

Model Name

Model Version

Show A...

Category Name

Family Name

Source_ID

MWH04-ARCH-R17

All

All

All

All

All

BIM TRACK

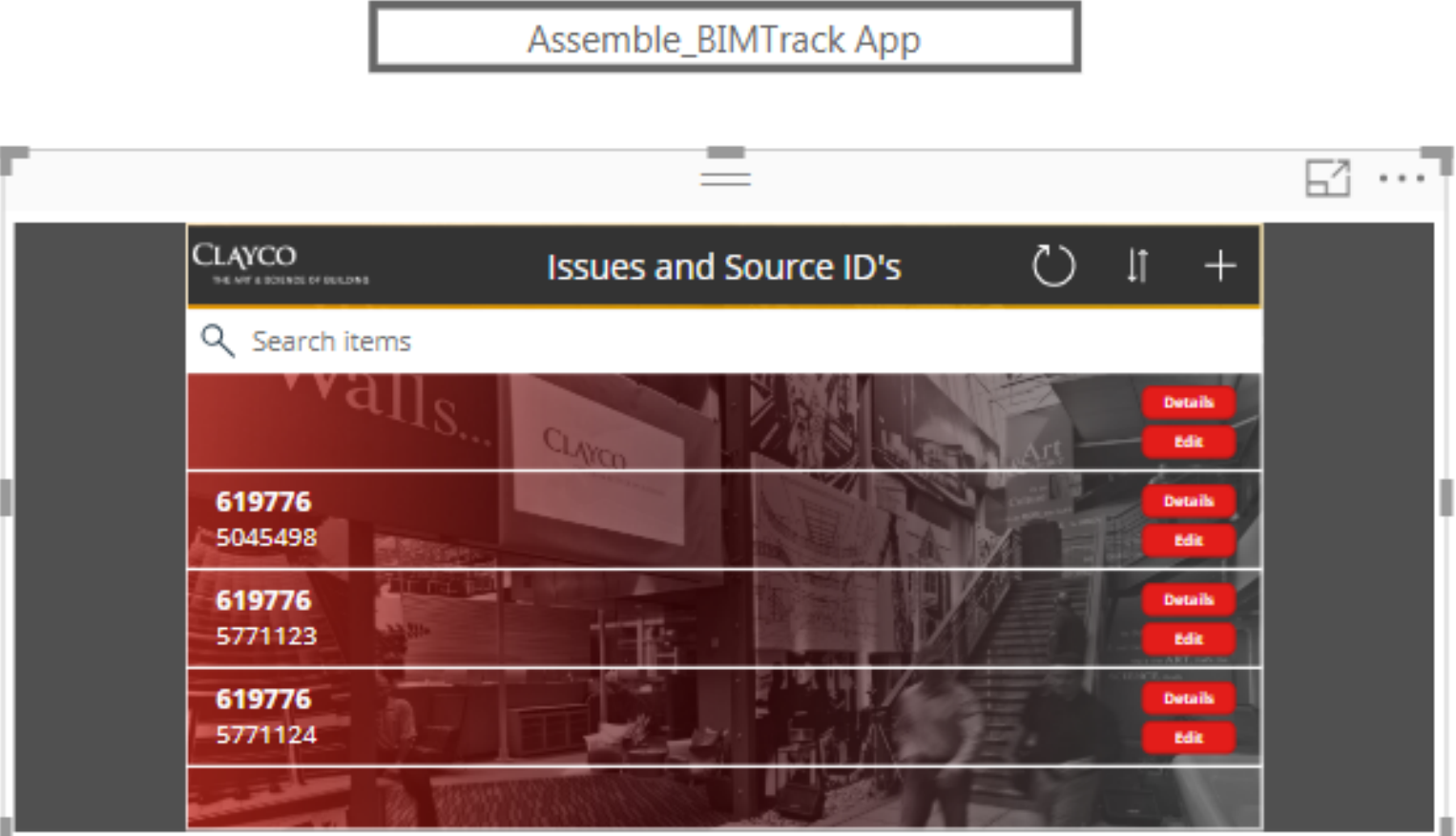
assemble

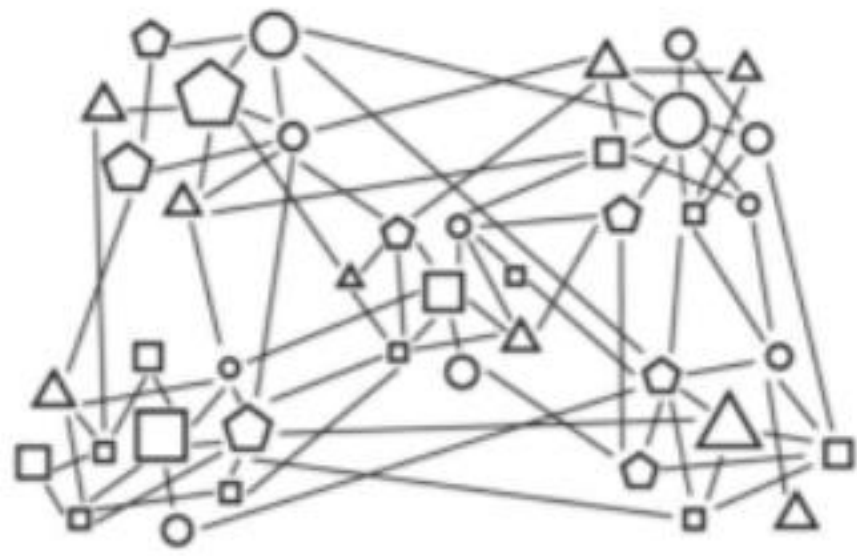
AN AUTODESK COMPANY

All Issues List

ProjectID	IssueID	Source_ID	Issue Number	Issue Title	Electrical	Fire Protect...	Mechanical	Plumbing	AssignedTo.LastName	Description
9138	619776	5771124	1	001 P-TI					GONG	Clash: Clash493 Clash Test: 06_MEPPF-TI ---
9138	619776	5771123	1	001 P-TI					GONG	Clash: Clash493 Clash Test: 06_MEPPF-TI ---
9138	619776	5045498	1	001 P-TI					GONG	Clash: Clash493 Clash Test: 06_MEPPF-TI ---
9138	1014090		333	SC/ARCH-05-ADMIN-3172					Kostial	Clayco to model missing access ladder steel.
9138	1014091		334	SC-05-ADMIN-3173					Bush	Need to reinforce or up size z-girts to W-8s
9138	1014092		335	FP/EC-05-COLO1-3174		Fire Protection			Hagadorn	FP hitting EC escutcheon plate at CAHU wall
9138	1014093		336	MP/SC-05-COLO3-3175			Mechanical		Fine	MP hanger clashing with PEMB kicker.
9138	1014094		337	MP/SC-05-COLO2-3176			Mechanical		Fine	MP hanger clashing with PEMB kicker.
9138	1014095		338	EC/MP-05-COLO1-3177	Electrical				Laskowski	EC VLC box hitting MP in pump room. This is
9138	1014096		339	MP/FP-05-COLO1-3178			Mechanical		Fine	MP hanger clashing with FP.
9138	1014097		340	EC/MP-05-COLO2-3179	Electrical				Laskowski	Small bore EC conduit into MP drilled pier.
9138	1014098		341	EC/MP-05-COLO2-3180	Electrical				Laskowski	Small bore EC conduit into MP drilled pier.

odel Version	v1 V1_20180706					v2
odel Name	Unit	Quantity	Count	Unit Cost Average	Unit	
WH04-ARCH-R17			12,614			
Casework	EA	41.00	41	\$0.00	EA	
06_Base Cabinet_Single Door_Drawer	EA	16.00	16	\$0.00	EA	
16"	EA	6.00	6	\$0.00	EA	
_106_Casework_4976000_5045498					EA	
_106_Casework_4976000_5045499					EA	
_106_Casework_4976000_5771123					EA	
_106_Casework_4976000_5771124					EA	
_106_Casework_4976000_5771196					EA	
total			12,614			





BIM Track Structure
BIM Track API Structure
BIM Track in Power BI
(M Language)
Disciplines (DAX)

Zones

Element ID
SQL
PowerApp

BIM 360 Field: Tracking Rooms Installation-Scanning Bar Code
Assemble: Tracking Rooms Installation-Scanning Bar Code
P6 and Assemble Schedule Integrator
Model Mashups: Design Iterations and Design vs Construction
Power BI Data Connector

Installation Status Tracking

4 Levels
(Conditional
Formatting)

Front end: DAX
Back end: M Language
Python Scripts

2 Levels
(Binary)

Installed Or Not
Forecasting



Q & A



Thank You!



Tomislav Zigo AIA, CM-BIM, LEED AP+C

Vice President of VDC

CLAYCO



Liang Gong PE, PMP, LEED AP+C

VDC Senior Data Manager

CLAYCO



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