



Autodesk COBie Extension for Navisworks 2017  
Quick start guide (V1.0)

# Autodesk COBie Extension for Navisworks 2017

## Quick start guide (V1.0)

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### Overview

The COBie Extension for Navisworks 2017 is used for mapping model object properties to the COBie standard. The extension supports reading from and writing to a SQLite database as well as exporting the COBie data as an Excel spreadsheet. The extension has been developed based on the Revit COBie output but can be adjusted to suit any model type that has the relevant COBie data available.

### Typical COBie Workflows Supported by this extension

This COBie extension is intended to be as flexible as Navisworks itself. Its main overall goal is allow users to create their COBie deliverables entirely from within the Navisworks environment from aggregated BIM models of varying source formats. The intent is to leverage existing non-graphic data already resident on the source BIM models that are imported into Navisworks and (if need be) add and create the nongraphic data required by COBie entirely within Navisworks.

Here are some model import scenarios that are supported:

#### 1.1 Revit models which have been “COBie enabled” using the Revit COBie extension

In this scenario, Revit models acted on by the Revit COBie extension are imported in Navisworks. During the import, the Plugin looks for the special COBie parameters on the Revit Objects and presents them in the Navisworks environment. Due to difference between the data structures between Revit and Navisworks, to “replicate exactly” a COBie deliverable created by the Revit COBie extension, the COBie spreadsheet exported from Revit also needs to be imported into Navisworks to the special COBie SQL Lite database that comes with the plugin. This is illustrated later on this document with the COBie challenge model.

#### 1.2 Any Revit Model

Although Autodesk *strongly recommends all users of Revit on your project deploy the Revit COBie extension*, we do recognize that there will be situations whereby you may have Revit models coming to you in various states. In addition you may have Revit models that have been formatted by the COBie extension but during the construction phase or your product it makes more sense to populate handover specific data while in the Navisworks environment. In this scenario we also account for those circumstances where a Revit user may have created their own unique Revit parameters to house COBie data. The plugin has the ability create custom mapping tables to map Revit Parameters to specific COBie fields in Navisworks.

#### 1.3 Models of other Formats (Non-Revit)

The overall goal of this Navisworks COBie extension is to aggregate any supported Navisworks Models into Navisworks and export COBie spreadsheets. Ideally this will include leveraging existing COBie nongraphic data that is already resident on the source models. Please be advised that this is limited by Navisworks ability to interpret the Nongraphic data on this models during the import process and we at Autodesk have not tested all scenarios. We have however tested importing a COBie IFC file produced by ArchiCAD. Including with this distribution of the COBie plugin is a video that shows the steps for doing this. In addition, we have some customers who have tested a scenario involving importing Models created with Autodesk Civil 3D and successfully produced a COBie deliverable from Navisworks.

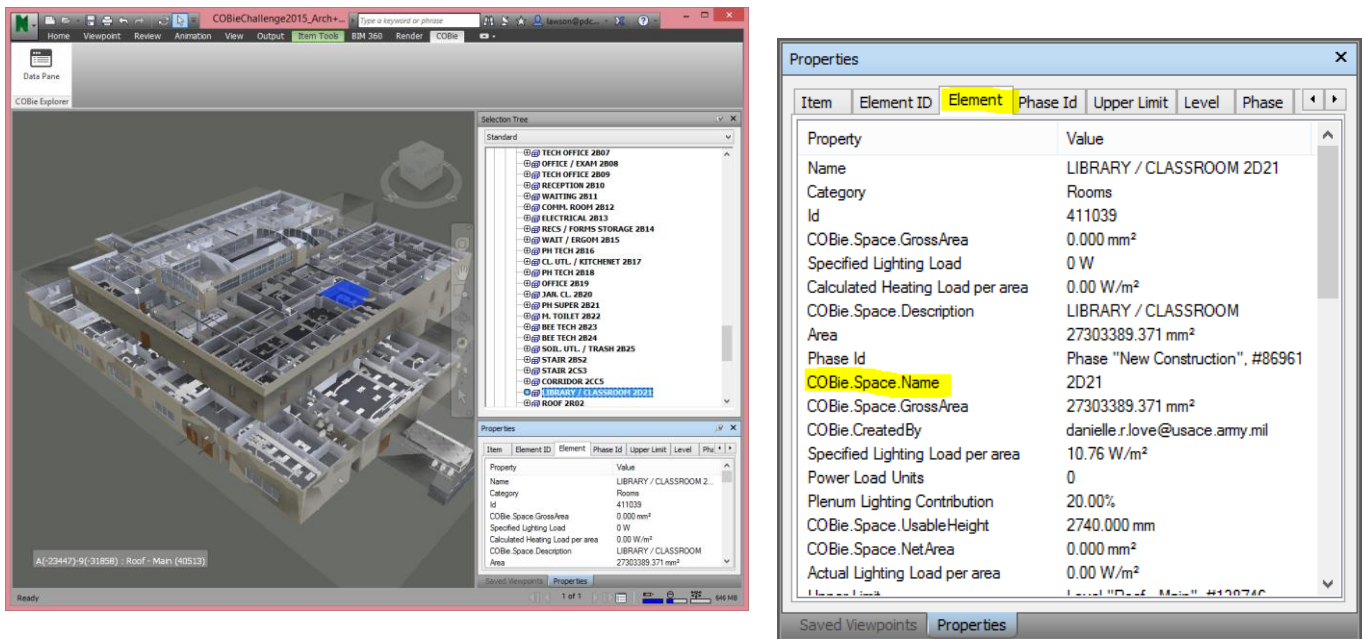
### Getting Started

The COBie Extension for Navisworks 2017 is installed using the setup executable for Simulate or Manage. Once the setup has finished the COBie Extension will be available from the COBie menu on the Navisworks ribbon. The ‘COBie Explorer’ panel button will remain disabled until a model is loaded.

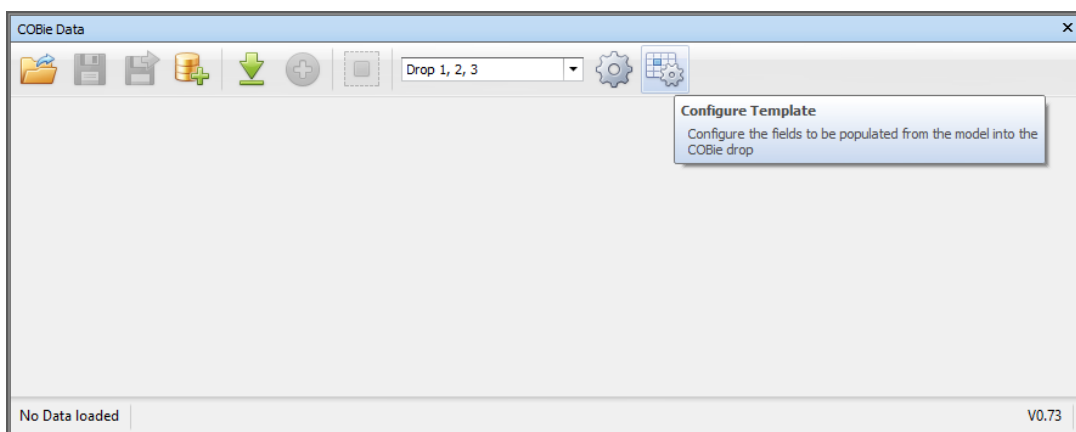
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### COBie Challenge Walkthrough (Basic Features)

Open the COBie challenge model 'COBieChallenge2015\_Arch+MEP.nwc'. The 'COBie Explorer' button will become enabled. Click on some of the items in the model (in first object resolution) and note the properties in some of the Revit tabs with the 'COBie.' prefix. For example the element tab has a 'COBie.Space.Name' property. Note that the COBie plugin will export any properties existing within a model, you are not limited to the properties described below.



Now launch the COBie Extension Data Pane from the Navisworks ribbon panel using the button on the 'COBie' tab. Once the panel appears, press the 'Configure Template' button to bring up the template configuration panel.

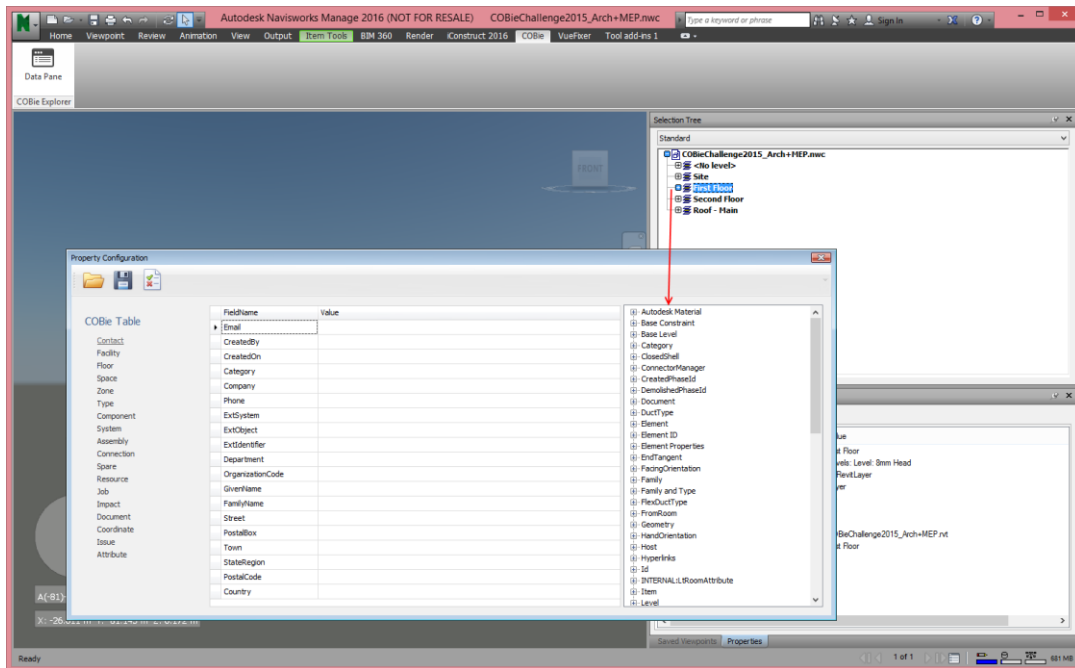


The configuration panel will open with no properties populated. To populate the list of properties, simply click on an item or selection in the loaded model. Note that the larger the selection the longer it may take to read all the property definitions, so best to start off with a smaller selection.

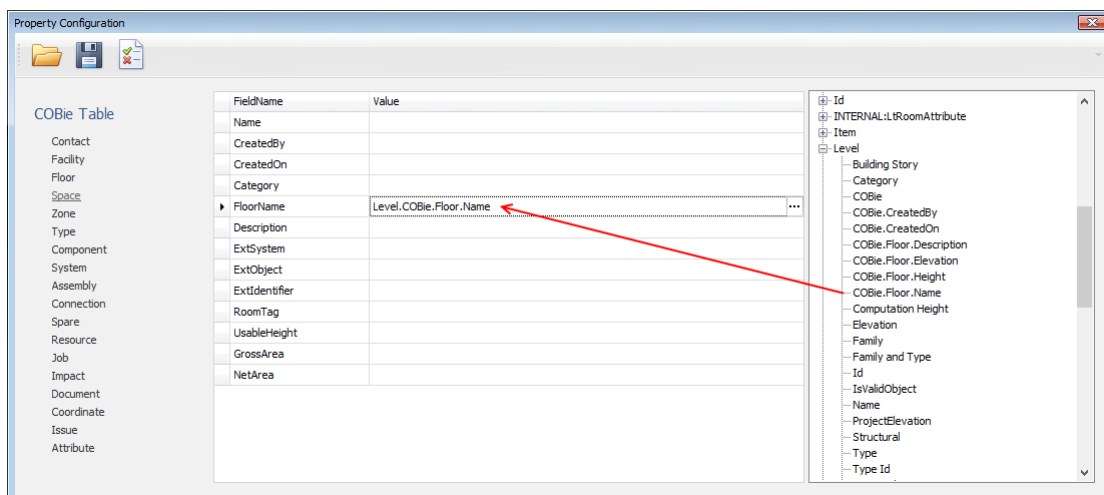
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In the example below, the 'First Floor' layer has been selected, which will populate the properties selection tree with all the unique data tabs and properties from the items within the selection.



To add a property to be read when importing the COBie data, first select the COBie table to add the property to, then simply drag and drop the property from the right hand property tree panel into the required field. For example below the 'Space' table has been selected and the 'Level' 'COBie.Floor.Name' property has been added. We could use any of the properties that represent the required data, from any model type that contains relevant information (ie IFC files, for example which will be covered in another chapter).



The property configuration panel has been designed to allow multiple properties per field and free text in any combination – there are a couple of important points to note though. The percent symbol % is a reserved character so should not be entered by the user (this may be changed in a later release). When the value cell is clicked for editing, the recognized Navisworks property will change to show formatting using the percentage symbol to denote the attribute and property name. The contents of the field cannot be changed but the field can be deleted. Care needs to be taken to delete a field in its entirety if this is required.

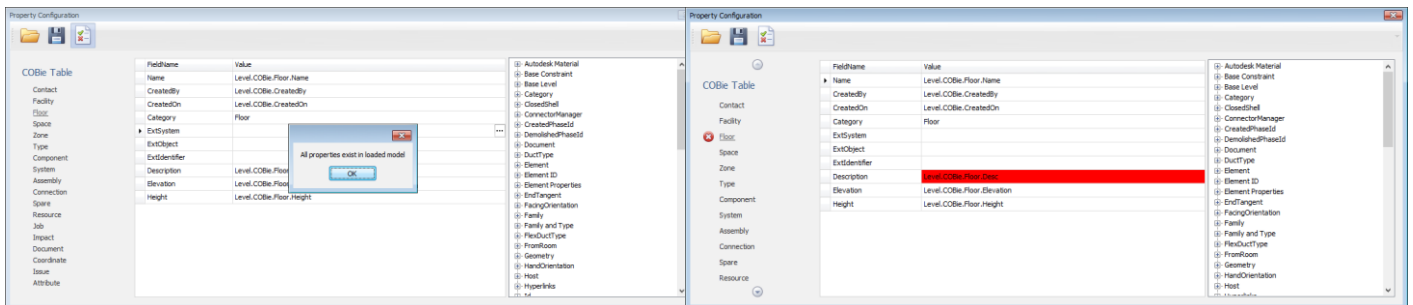
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The example below shows the prefix 'Floor' with a space being added to the floor name property added earlier (so the COBie output would be 'Floor Site' for example). Note the text will change on edit, and an ellipsis button appears at the end, this is for multiple properties which is covered in the ArchiCAD IFC export walkthrough later on.

	Category	
I	FloorName	Floor %Level%. %COBie.Floor.Name%
	Description	

Repeat the steps for all required fields, or to skip through, load the 'COBieChallenge2015\_TestTemplate.xlsx' file using the 'Open Template' (folder icon) button on the top left. You will be prompted to save your work – click 'No' to save using the 'Save' button to the right of the 'Open Template' button, or click 'Yes' to continue and discard changes.

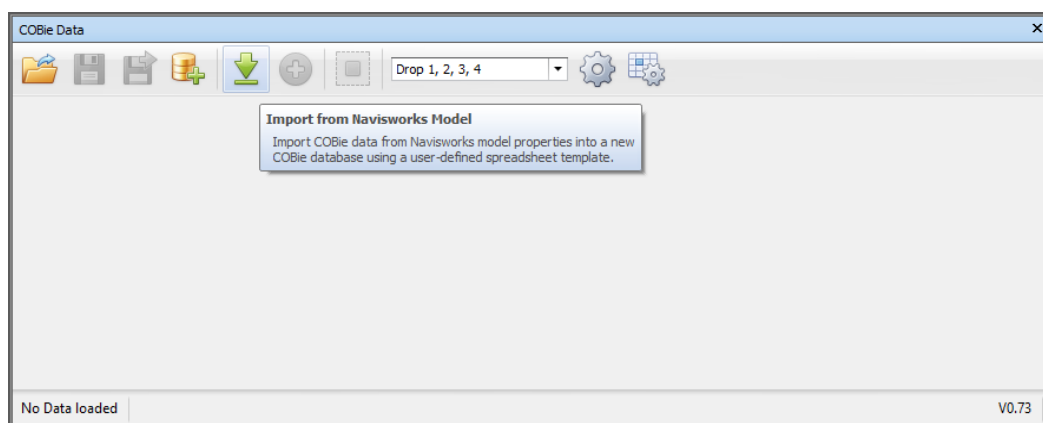
Have a look through the table at how the fields are configured, and then click the 'Validation' button (the last button on the right). This doesn't validate the template against COBie standards but instead checks all the selected properties are available in the currently loaded model. If a property does not exist it will highlight with a warning next to the table name and colour the cell red – this is not critical but helpful to spot typographical errors.



*All properties valid*

*Property not found in model*

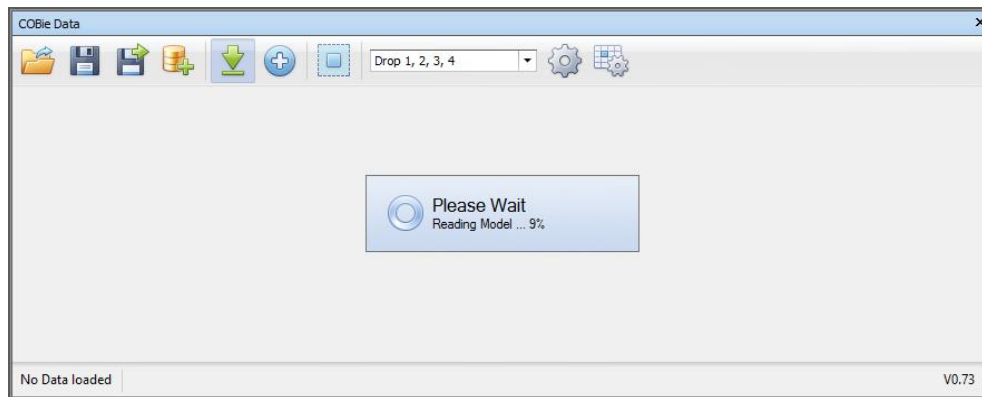
Save any changes made to the template and close the panel to return to the COBie Data pane. The COBie Data pane will have appeared without any data loaded. The only button on the toolbar we are currently interested in is the 'Import from Navisworks Model' button.



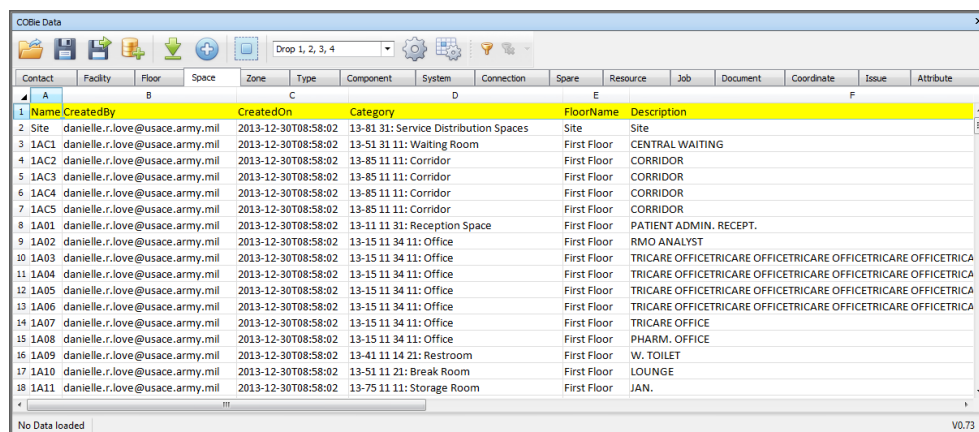
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The import will work on the currently selected items, so select the entire model. Click this button and open the 'COBieChallenge2015\_TestTemplate.xlsx' file we looked at before. The COBie Extension will now start reading from the model.



Once the process has finished, click on the 'Spaces' tab and note the information has been imported from the model into a spreadsheet control.



The screenshot shows the 'COBie Data' application window with a spreadsheet view. The spreadsheet has columns for Name, CreatedBy, CreatedOn, Category, FloorName, and Description. The data is as follows:

Name	CreatedBy	CreatedOn	Category	FloorName	Description
2 Site	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-81 31: Service Distribution Spaces	Site	Site
3 1AC1	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-51 31 11: Waiting Room	First Floor	CENTRAL WAITING
4 1AC2	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-85 11 11: Corridor	First Floor	CORRIDOR
5 1AC3	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-85 11 11: Corridor	First Floor	CORRIDOR
6 1AC4	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-85 11 11: Corridor	First Floor	CORRIDOR
7 1AC5	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-85 11 11: Corridor	First Floor	CORRIDOR
8 1A01	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-11 11 31: Reception Space	First Floor	PATIENT ADMIN. RECEPT.
9 1A02	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-15 11 34 11: Office	First Floor	RMO ANALYST
10 1A03	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-15 11 34 11: Office	First Floor	TRICARE OFFICETRICARE OFFICETRICARE OFFICETRICARE OFFICETRICARE
11 1A04	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-15 11 34 11: Office	First Floor	TRICARE OFFICETRICARE OFFICETRICARE OFFICETRICARE OFFICETRICARE
12 1A05	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-15 11 34 11: Office	First Floor	TRICARE OFFICETRICARE OFFICETRICARE OFFICETRICARE OFFICETRICARE
13 1A06	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-15 11 34 11: Office	First Floor	TRICARE OFFICETRICARE OFFICETRICARE OFFICETRICARE OFFICETRICARE
14 1A07	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-15 11 34 11: Office	First Floor	TRICARE OFFICE
15 1A08	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-15 11 34 11: Office	First Floor	PHARM. OFFICE
16 1A09	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-41 11 14 21: Restroom	First Floor	W. TOILET
17 1A10	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-51 11 21: Break Room	First Floor	LOUNGE
18 1A11	danielle.r.love@usace.army.mil	2013-12-30T08:58:02	13-75 11 11: Storage Room	First Floor	JAN.

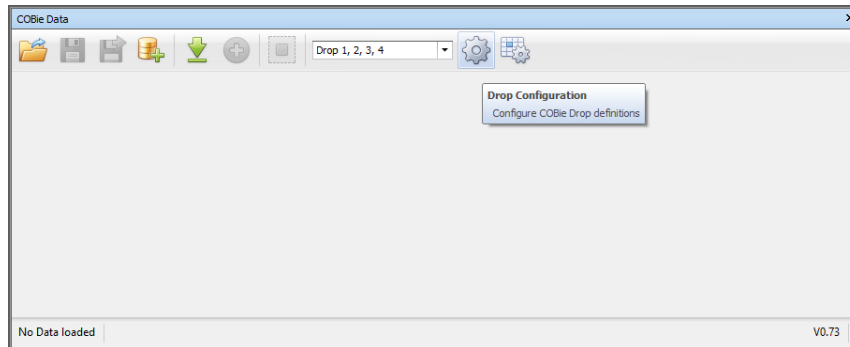
The window title bar includes standard icons and a dropdown menu set to 'Drop 1, 2, 3, 4'. At the bottom left, it says 'No Data loaded' and at the bottom right, the version 'V0.73' is displayed.

At this point the data can be manually edited as required, saved as an SQLite database, or exported to an Excel spreadsheet.

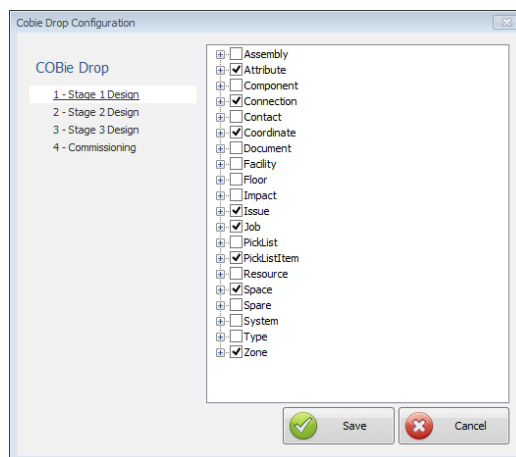
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### COBie Drop Filter

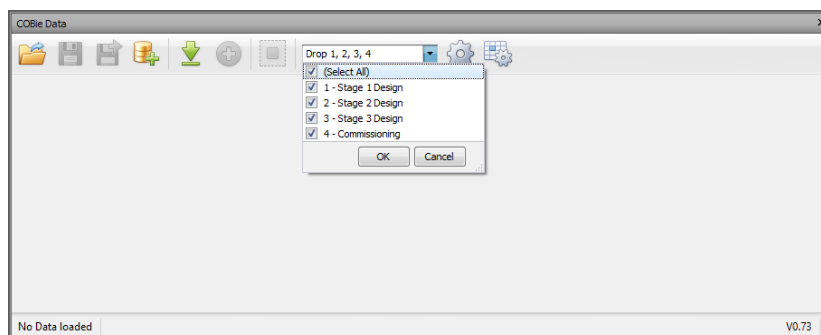
The COBie Extension will read all the properties specified in the template by default. In some circumstances the COBie deliverables may be required to contain different sub-sets of COBie data. The plugin allows for 4 defined drops in 4 stages – Stage 1 Design, Stage 2 Design, Stage 3 Design and Stage 4 Commissioning. To configure the drop definitions, click the 'Drop Configuration' button.



This will bring up the drop configuration panel. To configure a drop definition, click the COBie Drop number on the left hand side, and check/uncheck the properties on the left.



Once the drop definitions have been saved, they can be enabled / disabled using the 'Drop Filter'



When the 'Import from Navisworks Model' button is run, all enabled checked COBie filters will be read and cumulatively applied. Only the properties configured will be read from the model during the import so this can also improve the amount of time taken to create the COBie output.



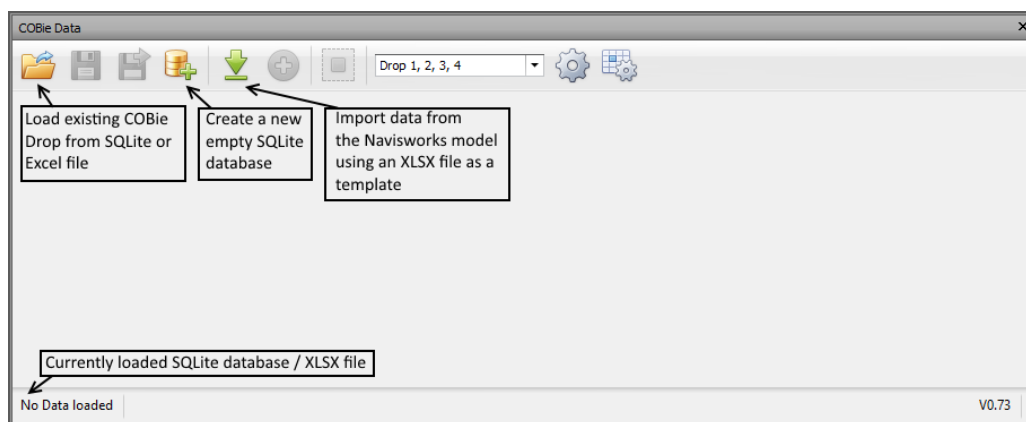
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### Initial Panel Layout

The bottom of the COBie panel displays the path & name of the currently loaded SQLite database, or indicates no database is loaded if this is the case.

When the panel is first loaded, it contains no data. The buttons available initially are:

- Load SQLite Database – loads an existing SQLite database
- Create New – creates a new, empty SQLite database
- Import From Navisworks Model – imports data from the Navisworks model, prompts for an XLSX file
- Drop Filter selection (see previous page)
- Drop Configuration
- Configure Template



#### Load Data

This will prompt the user for an existing SQLite database or XLSX file. The file must contain a COBie-compliant table structure as it is intended to be used to load COBie data previously exported using the COBie tool.



#### Create New

If the user is manually creating a COBie drop, this button can be used to create a new empty SQLite file. No data will be imported from the model into this file initially (although it can be added using 'Append Data', which will be covered later in the document).



#### Import from Navisworks Model

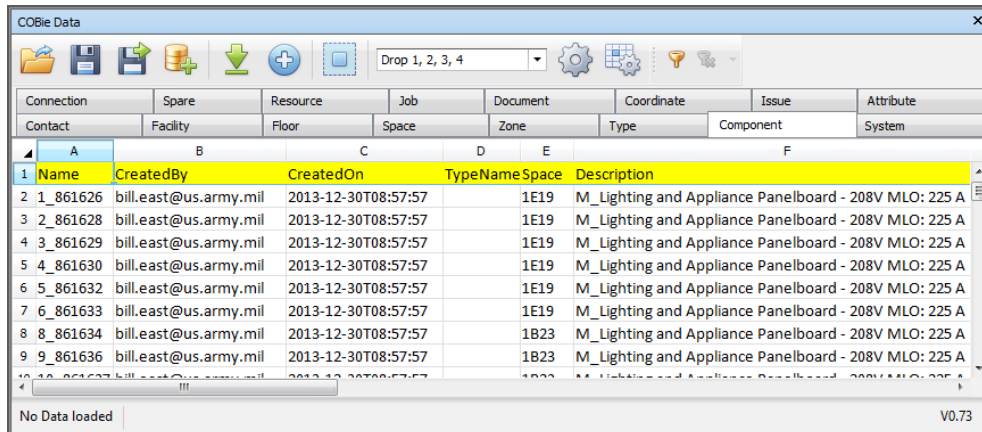
This is the primary use of the tool, importing COBie data from the model using an XLSX file as a template. First make a selection in the model, or the entire model. The user will be prompted for an XLSX file before processing the model and extracting the data to a spreadsheet control.

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#### COBie Data Layout

Once the COBie data has been loaded, the panel will contain a spreadsheet control and further buttons become enabled. Also some spreadsheet-related toolbars appear which can be useful when editing the COBie data.



1	Name	CreatedBy	CreatedOn	TypeName	Space	Description
2	1_861626	bill.east@us.army.mil	2013-12-30T08:57:57	1E19		M_Lighting and Appliance Panelboard - 208V MLO: 225 A
3	2_861628	bill.east@us.army.mil	2013-12-30T08:57:57	1E19		M_Lighting and Appliance Panelboard - 208V MLO: 225 A
4	3_861629	bill.east@us.army.mil	2013-12-30T08:57:57	1E19		M_Lighting and Appliance Panelboard - 208V MLO: 225 A
5	4_861630	bill.east@us.army.mil	2013-12-30T08:57:57	1E19		M_Lighting and Appliance Panelboard - 208V MLO: 225 A
6	5_861632	bill.east@us.army.mil	2013-12-30T08:57:57	1E19		M_Lighting and Appliance Panelboard - 208V MLO: 225 A
7	6_861633	bill.east@us.army.mil	2013-12-30T08:57:57	1E19		M_Lighting and Appliance Panelboard - 208V MLO: 225 A
8	8_861634	bill.east@us.army.mil	2013-12-30T08:57:57	1B23		M_Lighting and Appliance Panelboard - 208V MLO: 225 A
9	9_861636	bill.east@us.army.mil	2013-12-30T08:57:57	1B23		M_Lighting and Appliance Panelboard - 208V MLO: 225 A
10	10_861637	bill.east@us.army.mil	2013-12-30T08:57:57	1B23		M_Lighting and Appliance Panelboard - 208V MLO: 225 A



#### Save Data

Saves the currently loaded SQLite database or XLSX file, alternatively displays the 'Save As' dialog if no database is currently loaded.



#### Save Data As

Exports the current data to a SQLite database or XLSX file. Each tab will be a different sheet in the Excel file



#### Append from Navisworks Model

Similar to 'Import from Navisworks Model', with the difference being that records are added to the current data.



#### Highlight Selected Items

This button acts as a toggle, when enabled, the items selected within the spreadsheet having a valid 'ExtIdentifier' field will be selected in the Navisworks model. Conversely when items in the Navisworks model are selected, the relevant rows in the currently active sheet will be highlighted. Presently this only works with Revit objects having an 'Element Properties->UniqueID' property and IFC objects having an 'IFC->GLOBALID' property.

In addition, there is an autofilter button to assist in navigating the COBie data.



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### COBie Exporter Data Loading Explained

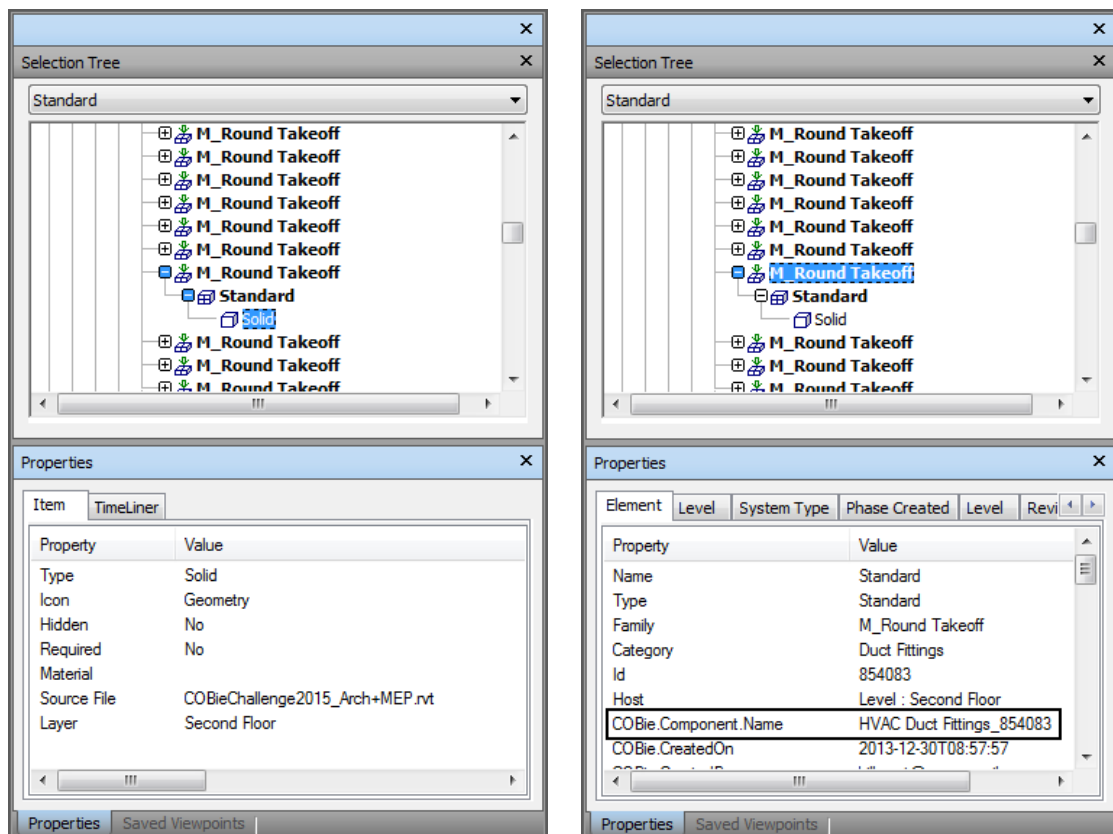
The XLXS file is used as a template for importing properties from the Navisworks model.

When the XLXS file is loaded, the COBie exporter makes a list of properties to read from the Navisworks model. In the example below there would be 4 fields searched for, all on the Element tab:

- COBie.Component.Name
- COBie.CreatedBy
- COBie.CreatedOn
- COBie.Space.Category

	A	B	C	D	E
1	Name	CreatedBy	CreatedOn	TypeName	Space
2	%Element%.%COBie.Component.Name%	%Element%.%COBie.CreatedBy%	%Element%.%COBie.CreatedOn%		%Element%.%COBie.Component.Space%
3					
4					
5					
6					

The COBie Exporter will then scan the selected model items for the matching data. The scan begins at each geometric object and climbs the model hierarchy until all the fields are populated or the top node is reached. An example of this is below, the 'Solid' node does not contain an 'Element' tab so COBie Exporter will climb the hierarchy until it reaches the 'M\_Round\_Takeoff' level where the 'Element' tab resides.



Once all the properties have been scanned for matches for the object, a row is added for the COBie object. Note that this means if for example an insert contains several sub-objects without any data, only one row will be added. For the COBie rows to be added for Floor, Space, Type, Component and Coordinate, the 'Name' column must be populated during the read. This avoids multiple blank objects in the COBie output.

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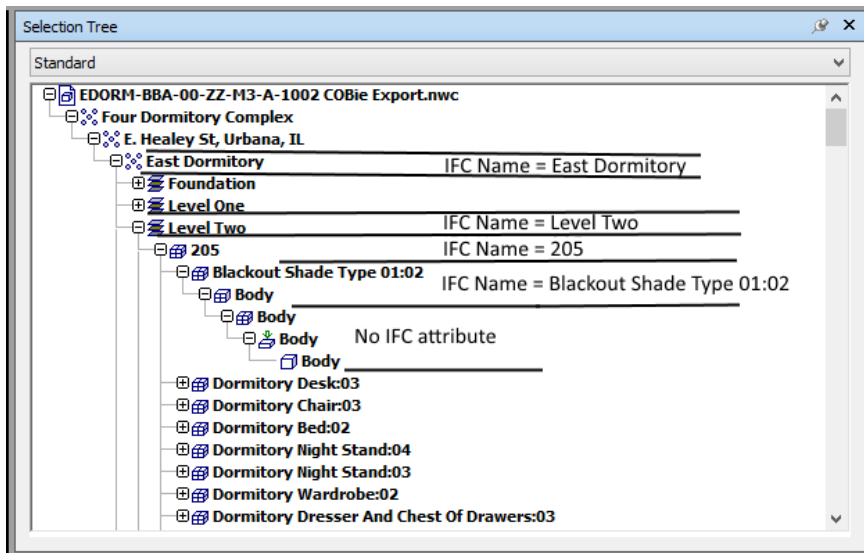
### Property Conditions

The process for generating COBie output from, say ArchiCAD IFC files in Navisworks is a little bit more complicated than for Revit, but achievable with a bit of work.

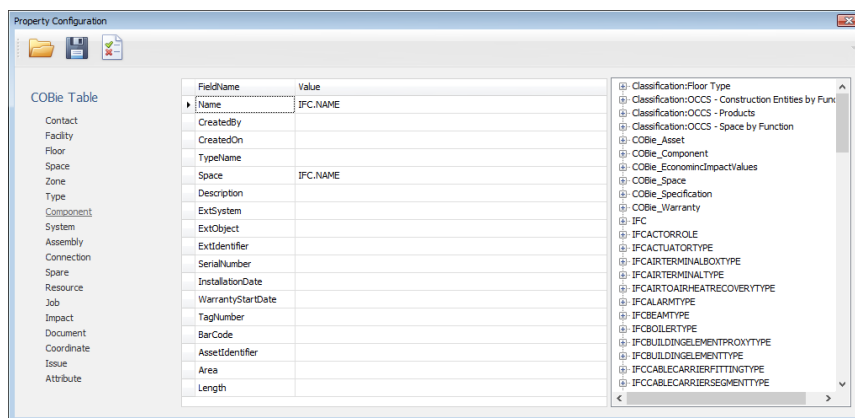
As with all model types, the key is to understand how the data is structured in the model and identifying the properties that map to the COBie outputs.

In this example the 'EDORM-BBA-00-ZZ-M3-A-2001 COBie Export' test model is being used. In this model structure properties reside at several different levels, and also the same attribute / property names may occur at different levels of the same hierarchy. This kind of hierarchy is not only found in IFC but may be found in other model types.

Looking at the lowest level 'Body' object in the image below, then working up to the 'East Dormitory' node it can be seen that the IFC Name can have different meanings depending on its level. As described in the previous page the export starts at the lowest level and moves up, reading the properties for the COBie drop as it goes.



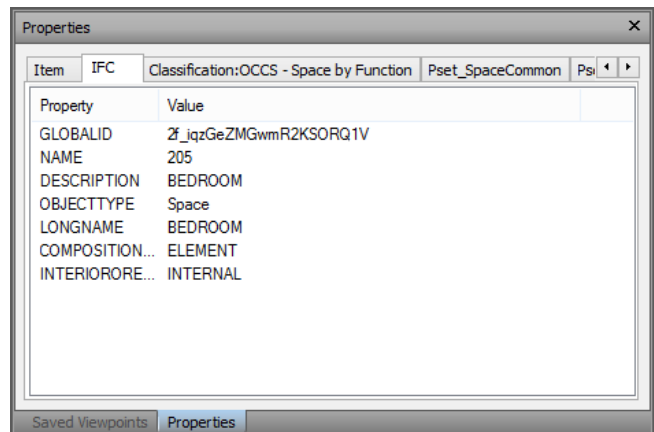
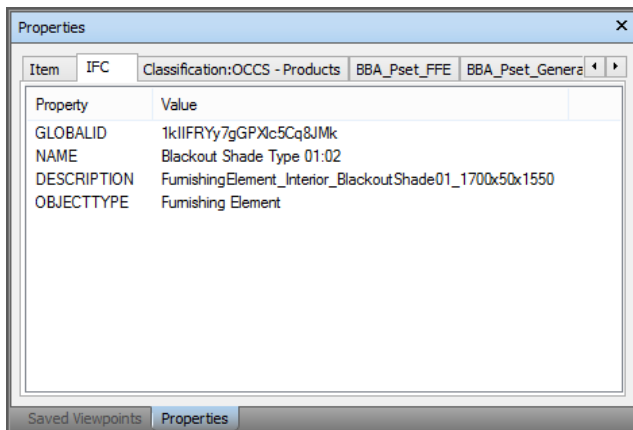
This can present a problem if for example for the 'Component' table requires the 'Blackout Shade Type 01:02' for the 'Name' field but '205' for the 'Space' field. If the template was filled out below, by default the plugin would read 'Blackout Shade Type 01:02' for both as it is the first instance of IFC Name.



The solution to this lies in 3 parts – having enough data in the model to be able to differentiate the levels, understanding the model data structure, and using that to add a condition to the field using the 'Configure Template' panel.

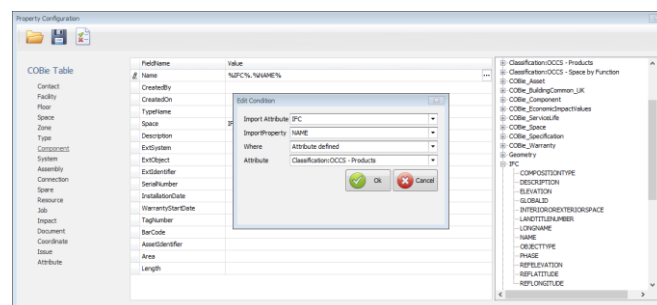
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In this case looking at the 'Blackout Shade Type 01:02' level and comparing it to the '205' level shows there are some identifying features that can be used to set the correct condition. The former also has a 'Classification:OCCS – Products' attribute whereas the latter does not, but has a 'Classification:OCCS – Space by Function' tab (also the IFC OBJECTYPE is 'Space', which could be used. Not all models may have this particular difference, but as long as there is enough information in the model to differentiate, the COBie Extension will be able to extract the correct data.

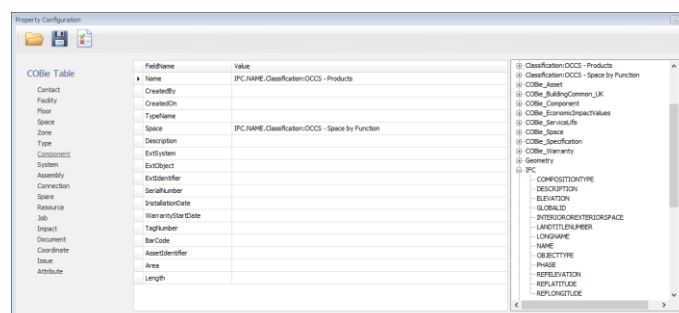


Now that the differences have been identified, the conditions can be entered using the 'Configure Template' panel, by clicking to edit the field, then double-clicking on the property name. This will launch the condition editor. In the example below the top property has been selected and the condition set to 'Attribute Defined' followed by selecting 'Classification:OCCS – Products'. The same method can be used to set the condition for the second property.

The other condition types that can be used are if a property is defined, and if a property value equals a nominated value.



Now the template contains some extra information, when double-clicked this will bring up the condition editor again to change/remove the condition.



When this template is run, it will only populate the Component Space field with the IFC Name property where the node also contains an attribute called 'Classification:OCCS – Space by Function', otherwise it will remain empty.

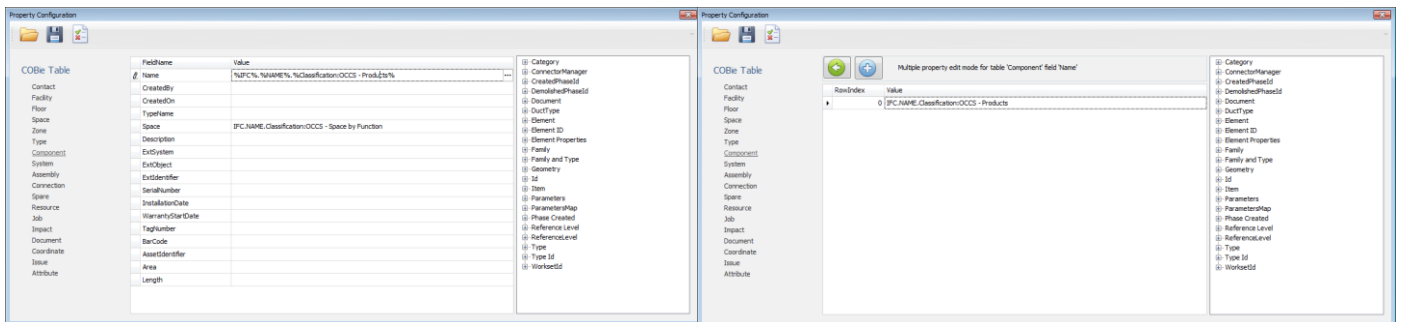
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### Template Configuration - Multiple Property Mode

There may be cases where it is required that several different model types are read at once, or it is advantageous to have one 'catch-all' import template. The COBie Extension facilitates this through the use of a multiple property mode. Using the previous example of an IFC file reading in the Component Name field, it is possible to add a Revit property to the same template.

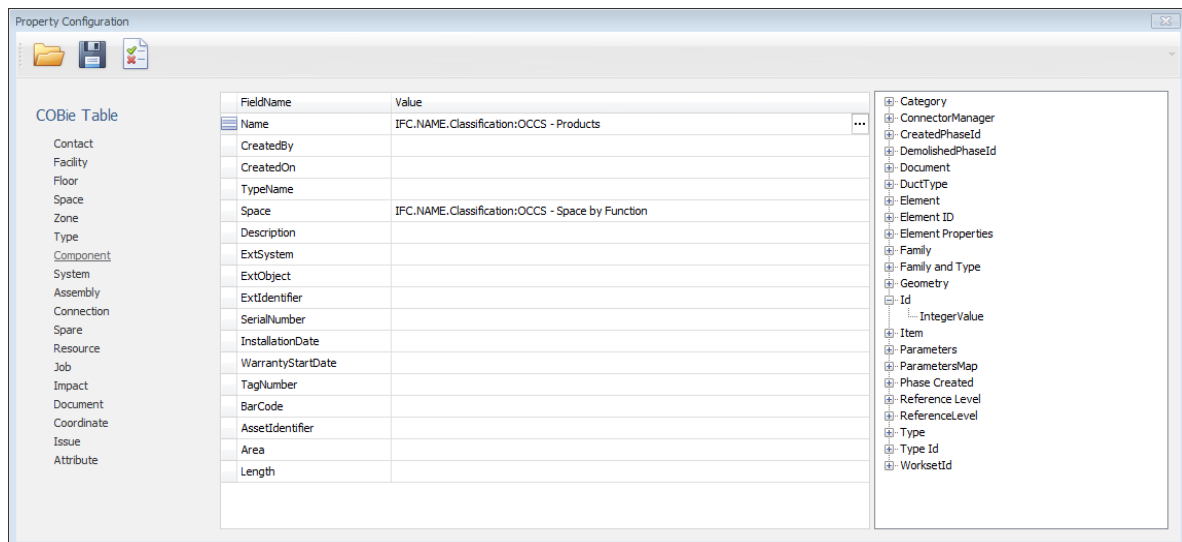
To do this, open the Revit model, then open the Template Configuration panel and load the template for the IFC model type. Click on one or more items in the Revit model to populate the Property tree on the right.

Click on the ellipsis button (...) on the right of the field and the view will switch to multiple property mode.



To add a property, click the plus + button and drag & drop / edit properties as normal. To delete a property select the row and press the delete key. Note that row 0 cannot be deleted. To return to the previous mode click the back arrow.

Fields with more than one property will have an indicator on the left side of the row (see below, the name field has an indicator).



When saving or validating, the defined multiple properties will be included.