

GRAPHISOFT ArchiCAD and COBie2

How to Prepare your ArchiCAD 17 Project for COBie2 Documentation

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GRAPHISOFT ArchiCAD and COBie2

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Contents

Introduction	4
ArchiCAD Model Preparation for COBie2	5
Contact.....	6
Facility	8
Floor	11
Space	13
Zone	14
Type.....	16
Component	18
System.....	20
Document / Attribute / Coordinate / PickLists	22
Assembly / Connection / Spare / Resource / Job / Impact / Issue	22
COBie2 Scheme Template	22
COBie2-enabled IFC Model Export	23
How to Create a COBie2 Spreadsheet	25

Introduction

COBie is the abbreviation of Construction Operations Building Information Exchange, a specification used in the handover of Facility Management information. It is a spreadsheet data format for the delivery of a subset of building model information, rather than geometric model information.

Although GRAPHISOFT ArchiCAD cannot export COBie spreadsheets directly, ArchiCAD's BIM-quality models and IFC data exchange capabilities produces data output that is easily converted into COBie documentation, with the help of free or commercial conversion programs.

What is the relationship between IFC and COBie?

The COBie spreadsheet is a mapping of the Basic FM Handover View Definition, which is a subset (so-called "Model View Definition"; MVD) of the current IFC 2x3 scheme. Basic FM Handover View Definition was developed by buildingSMART to exchange facility management information among building models. ArchiCAD 17's IFC 2x3 interface and database support the IFC data and model export requirements of the Basic FM Handover View Definition, so most of the values of the COBie spreadsheet cells are extracted from IFC models exported by ArchiCAD 17 according to the Basic FM Handover MVD settings.

Hint To read more information about the relation between IFC 2x3 Basic FM Handover MVD and COBie, visit the buildingSMART website by clicking [here](#).

This paper provides practical information on which data to add to an ArchiCAD project and how to export it as an IFC model, to obtain a format suitable for producing a COBie2 spreadsheet. (The current version of COBie is 2.4.) The final chapter consists of a sample workflow using a free IFC → COBie conversion tool recommended by buildingSMART.

Hint For detailed documentation about ArchiCAD's IFC capabilities, visit the GRAPHISOFT website by clicking [here](#).

Note This documentation was written based on the currently available COBie – IFC mapping rule called "Responsibility Matrix version 17" (published 30th April 2013).

ArchiCAD Model Preparation for COBie2

The Basic FM Handover View Definition used by COBie2 queries the following IFC data types from an architectural model and/or its elements:

- Owner History data
- IFC Attributes
- IFC Properties (standard IFC 2x3 and custom COBie2-required properties)
- IFC Classification Reference data
- IFC Type Product entities
- IFC Zone assignments
- IFC System assignments
- Base quantities
- Space containment relation
- Space boundary relation

All of these data types are available or can be created in ArchiCAD 17 using one or more of these functions:

- Element Settings dialog boxes
- the *IFC Manager* tool
- IFC Translator settings used for IFC model export

This chapter summarizes the data (required from a design application) to be provided in ArchiCAD 17 for use by the COBie2 spreadsheet worksheet.

	A	B	C
1	Title	COBie2	
2	Version	2	
3	Release	4	
4	Status	IFC2x3	
5	Region	en-US	
6	Purpose		This spreadsheet supports the exchange of building, system and product information through the life of the project.
7	Outline		Individual worksheets are organized by project phase as shown below
8			
9	All Phases	Sheet	Contents
10		Contact	People and Companies
11			
12	Early Design Worksheets	Sheet	Contents
13		Facility	Project, Site, and Facility
14		Floor	Vertical levels and exterior areas
15		Space	Spaces
16		Zone	Sets of spaces sharing a specific attribute
17		Type	Types of equipment, products, and materials
18			
19	Detailed Design Worksheets	Sheet	Contents
20		Component	Individually named or schedule items
21		System	Sets of components providing a service
22		Assembly	Constituents for Types, Components and others
23		Connection	Logical connections between components
24		Impact	Economic, Environmental and Social Impacts at various stages in the life cycle
25			
26	Construction Worksheets	Sheet	Contents
27			Note: submittals and approvals added on Documents
28			Note: manufacturer and model added on Type
29			Note: serial and tag added on Component
30			
31	Operations and Maintenance Worksheets	Sheet	Contents
32		Spare	Onsite and replacement parts
33		Resource	Required materials, tools, and training
34		Job	PM, Safety, and other job plans
35			Note: warranty information added on Type
36			

Figure 1 The worksheets of the COBie2 spreadsheet

Key to tables displayed in the following sections of this document:

COBie2 data COBie2 data taken directly from data that was input in ArchiCAD. In other words, the ArchiCAD and IFC data types corresponding to these COBie data must be set or created in the ArchiCAD model.

COBie2 data COBie2 data that are automatically extracted from the ArchiCAD model, project settings and their IFC export. In other words, these COBie data are set automatically in ArchiCAD; no extra data definition is required from the ArchiCAD user.

Contact

The COBie2 **Contact** worksheet summarizes the person and organization data of the project/model designer.

Contact COBie2 spreadsheet data	ArchiCAD (IFC) data mapped to COBie data	ArchiCAD command
Email	Owning User of Owner History > Person /Organization tab > Addresses > Address type: Telecom > ElectronicMailAddress	File > File Special > IFC 2x3 > IFC Options
CreatedBy	Owning User of Owner History > Person /Organization tab > Addresses > Address type: Telecom > ElectronicMailAddress	(File > File Special > IFC 2x3 > IFC Options)
CreatedOn	the creation date of the IFC file	
Category	Owning User of Owner History > Person /Organization tab > Roles	File > File Special > IFC 2x3 > IFC Options
Company	Owning User of Owner History > Organization tab > Name	File > File Special > IFC 2x3 > IFC Options
Phone	Owning User of Owner History > Person /Organization tab > Addresses > Address type: Telecom > TelephoneNumbers	File > File Special > IFC 2x3 > IFC Options
ExtSystem	text: 'ArchiCAD-64'	
ExtObject	text: 'IfcPersonAndOrganization'	
ExtIdentifier	Owning User of Owner History > Person /Organization tab > Addresses > Address type: Telecom > ElectronicMailAddress	(File > File Special > IFC 2x3 > IFC Options)
Department	Owning User of Owner History > Person /Organization tab > Addresses > Address type: Postal > InternalLocation	File > File Special > IFC 2x3 > IFC Options
OrganizationCode	Owning User of Owner History > Organization tab > ID	File > File Special > IFC 2x3 > IFC Options
GivenName	Owning User of Owner History > Person tab > GivenName	File > File Special > IFC 2x3 > IFC Options
FamilyName	Owning User of Owner History > Person tab > FamilyName	File > File Special > IFC 2x3 > IFC Options
Street	Owning User of Owner History > Person /Organization tab > Addresses > Address type: Postal > AddressLines	File > File Special > IFC 2x3 > IFC Options
PostalBox	Owning User of Owner History > Person /Organization tab > Addresses > Address type: Postal > PostalBox	File > File Special > IFC 2x3 > IFC Options
Town	Owning User of Owner History > Person /Organization tab > Addresses > Address type: Postal > Town	File > File Special > IFC 2x3 > IFC Options
StateRegion	Owning User of Owner History > Person /Organization tab > Addresses > Address type: Postal > Region	File > File Special > IFC 2x3 > IFC Options
PostalCode	Owning User of Owner History > Person /Organization tab > Addresses > Address type: Postal > PostalCode	File > File Special > IFC 2x3 > IFC Options
Country	Owning User of Owner History > Person /Organization tab > Addresses > Address type: Postal > Country	File > File Special > IFC 2x3 > IFC Options

Figure 2 Mapping between ArchiCAD model data and the COBie2 **Contact** worksheet data

ArchiCAD project data must be assigned to correspond with the COBie2 items marked in green (the rest of the data are automatically extracted from the IFC model saved from ArchiCAD).

The “Person” and “Organization” data can be entered in ArchiCAD’s *IFC Options* (File > File Special > IFC 2x3) dialog box at *Owning User of Owner History*. Both “Postal” and “Telecom” address types must be defined, but only once, as “Person” or as “Organization” “Address” data.

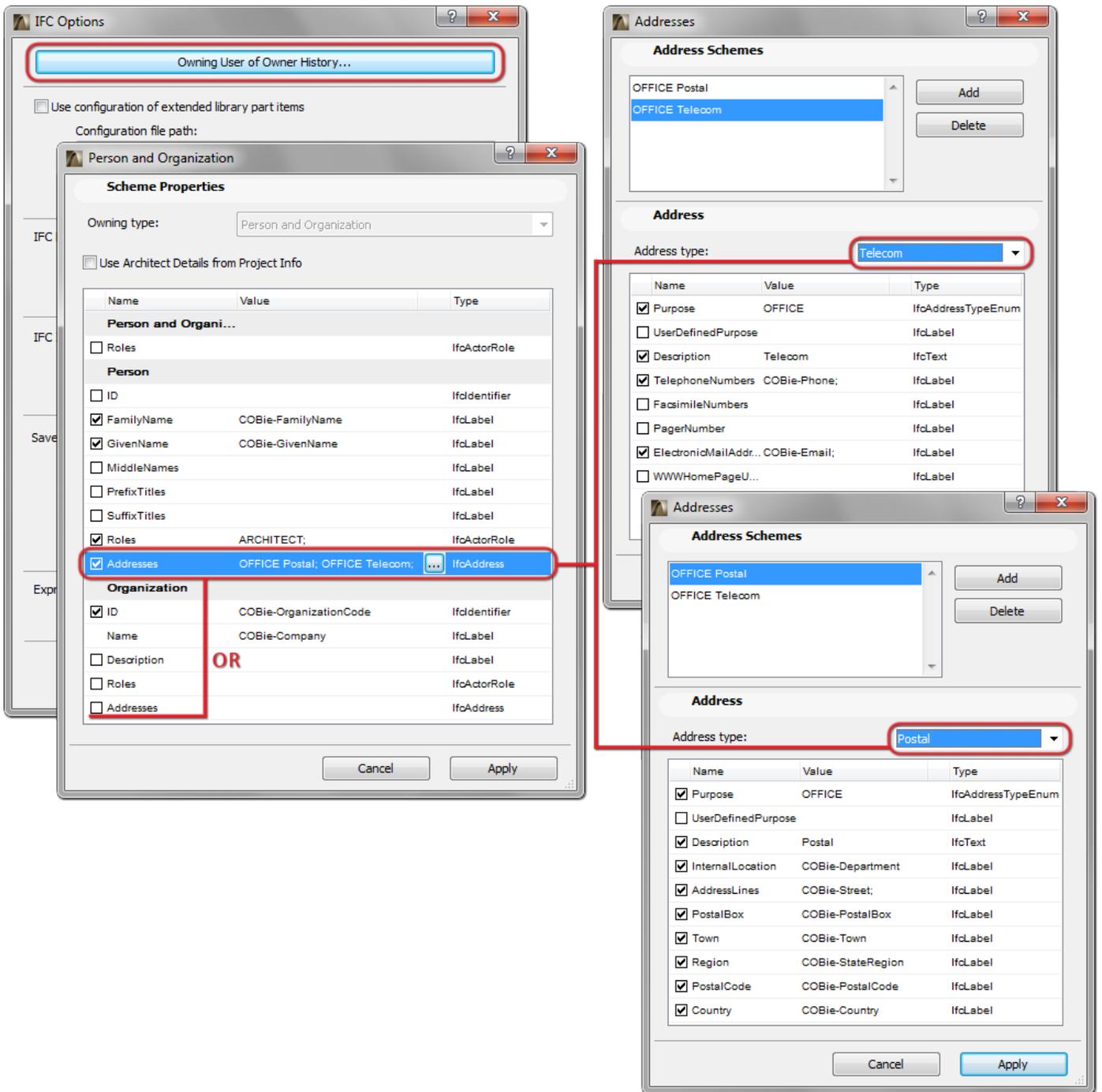


Figure 3 Contact data in ArchiCAD (Person and Organization)

Facility

The COBie2 **Facility** worksheet summarizes the Facility (IfcBuilding), Project (IfcProject) and Site (IfcSite) data.

Facility COBie2 spreadsheet data	ArchiCAD (IFC) data mapped to COBIE data	ArchiCAD command
Name	the <i>Name</i> attribute of the IfcBuilding	File > File Special > IFC 2x3 > IFC Manager
CreatedBy	Owning User of Owner History > Person /Organization tab > Addresses > Address type: Telecom > ElectronicMailAddress	(File > File Special > IFC 2x3 > IFC Options)
CreatedOn	the creation date of the IFC file	
Category	Classification Reference data (<i>ItemReference : Name</i>) of the IfcBuilding	File > File Special > IFC 2x3 > IFC Manager
ProjectName	the <i>Project Name</i> ,or the <i>Name</i> attribute of the IfcProject	File > Info > Project Info ,or File > File Special > IFC 2x3 > IFC Manager
SiteName	the <i>Name</i> attribute of the IfcSite	File > File Special > IFC 2x3 > IFC Manager
LinearUnits	Export Options tab > IFC model units > Options > Length Unit	File > File Special > IFC 2x3 > IFC Translation Setup
AreaUnits	Export Options tab > IFC model units > Options > Area Unit	File > File Special > IFC 2x3 > IFC Translation Setup
VolumeUnits	Export Options tab > IFC model units > Options > Volume Unit	File > File Special > IFC 2x3 > IFC Translation Setup
CurrencyUnit	Export Options tab > IFC model units > Options > Currency Unit	File > File Special > IFC 2x3 > IFC Translation Setup
AreaMeasurement	text: ' <i>ArchiCAD BIM Base Quantities</i> '	
ExternalSystem	text: ' <i>ArchiCAD-64</i> '	
ExternalProjectObject	text: ' <i>IfcProject</i> '	
ExternalProjectIdentifier	the <i>GlobalId</i> attribute of the IfcProject	(File > File Special > IFC 2x3 > IFC Manager)
ExternalSiteObject	text: ' <i>IfcSite</i> '	
ExternalSiteIdentifier	the <i>GlobalId</i> attribute of the IfcSite	(File > File Special > IFC 2x3 > IFC Manager)
ExternalFacilityObject	text: ' <i>IfcBuilding</i> '	
ExternalFacilityIdentifier	the <i>GlobalId</i> attribute of the IfcBuilding	(File > File Special > IFC 2x3 > IFC Manager)
Description	the <i>Description</i> (or <i>LongName</i> or <i>Name</i>) attribute of the IfcBuilding	File > File Special > IFC 2x3 > IFC Manager
ProjectDescription	the <i>Description</i> (or <i>LongName</i> or <i>Name</i>) attribute of the IfcProject	File > File Special > IFC 2x3 > IFC Manager
SiteDescription	the <i>Description</i> (or <i>LongName</i> or <i>Name</i>) attribute of the IfcSite	File > File Special > IFC 2x3 > IFC Manager
Phase	the <i>Phase</i> attribute of the IfcProject	File > File Special > IFC 2x3 > IFC Manager

Figure 4 Mapping between ArchiCAD model and the COBie2 **Facility** worksheet data

The Facility data (including the Facility “Name”) can be defined as the attributes of the IfcProject, IfcSite and IfcBuilding IFC entities in the *IFC Manager* dialog (File > File Special > IFC 2x3).

The “ProjectName” data of the Facility worksheet can be set in ArchiCAD at *Project Info* (File > Info) or as the “Name” attribute of the IfcProject in the *IFC Manager*.

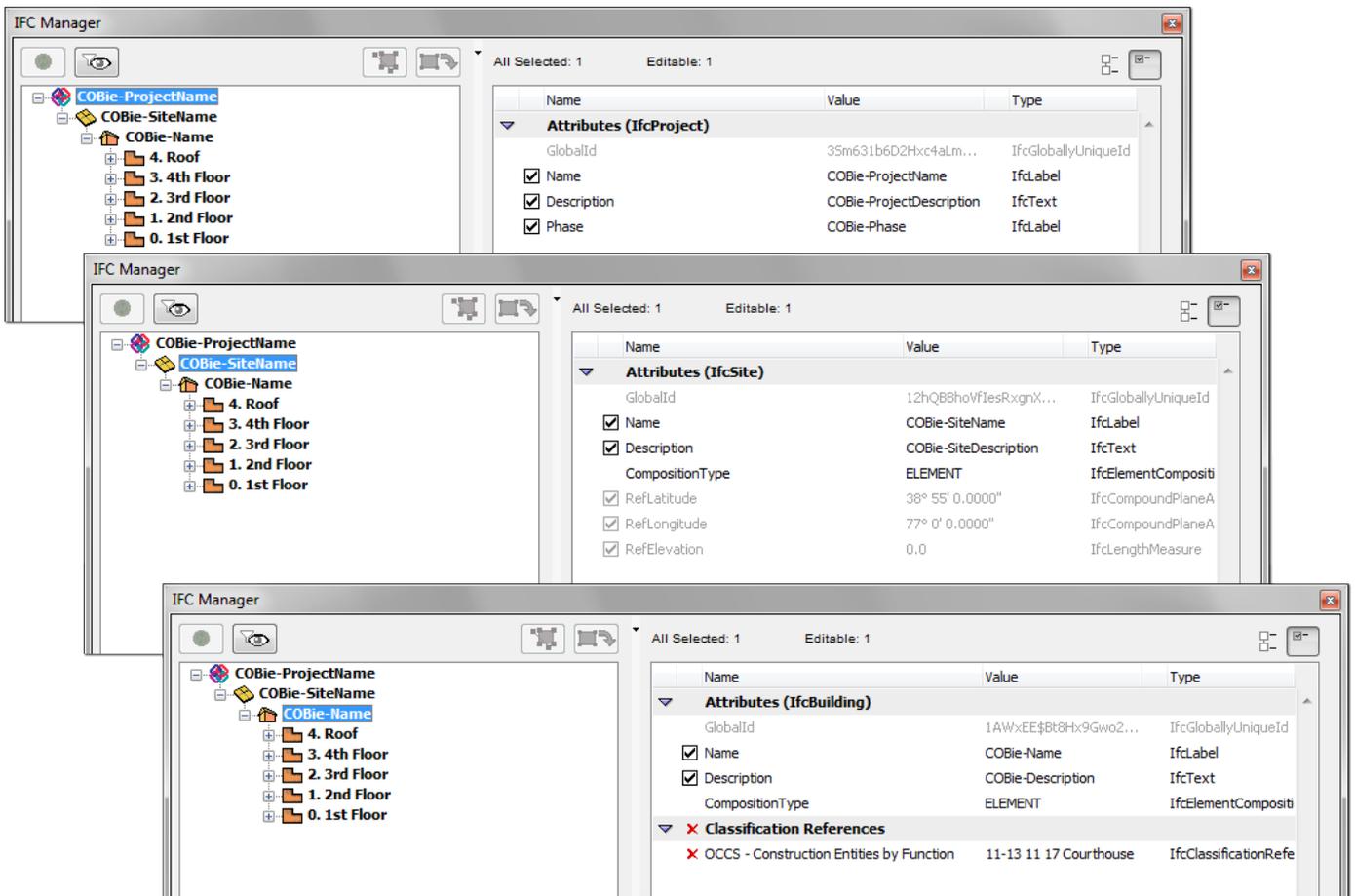


Figure 5 Attributes of IfcProject, IfcSite and IfcBuilding entities required by COBie2 (IFC Manager)

To set the Facility “Category”, define Classification Reference data in the *IFC Manager*. COBie requires IfcBuilding classification by the OmniClass table 11 called “Construction Entities by Function” in US or by the Uniclass system in UK. Both systems are available as built-in classification rules in ArchiCAD under the *Apply Predefined Rule* option in the *IFC Manager*.

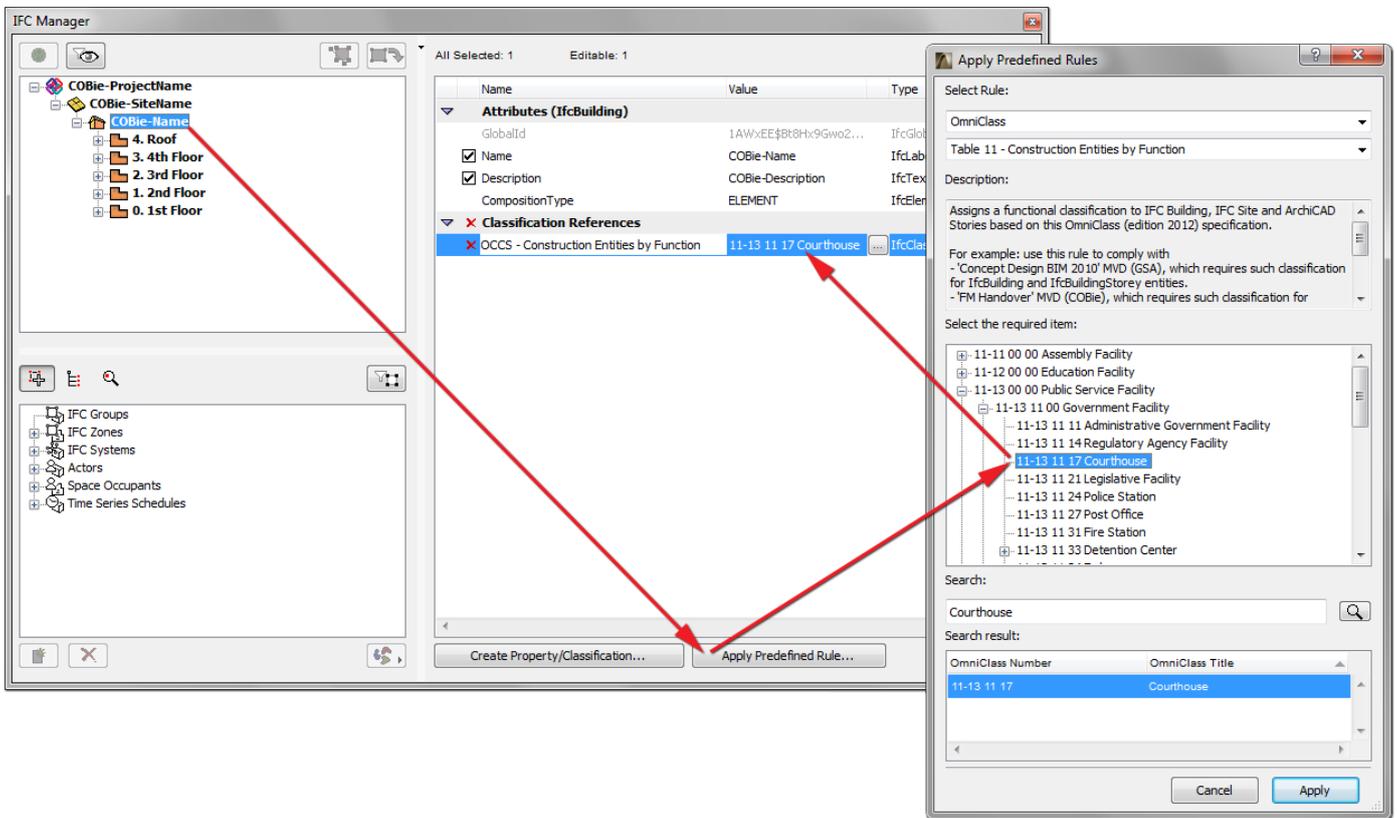


Figure 6 COBie Facility Category set as Classification Reference data of IfcBuilding (IFC Manager)

The COBie-required unit systems of the Facility can be set at the export options (*IFC Translation Setup*). There is a predefined settings package (so-called “IFC Translator” in ArchiCAD) which contains the export options (including the required length, area, volume, currency and time units) recommended for the COBie-required IFC export. It is called “Basic FM Handover View” IFC Translator (see chapter [COBie2-enabled IFC Model Export](#)).

Floor

The COBie2 **Floor** worksheet summarizes data of the building stories (IfcBuildingStorey).

Floor COBie2 spreadsheet data	ArchiCAD (IFC) data mapped to COBIE data	ArchiCAD command
Name	the <i>Name</i> attribute of an ArchiCAD Story (IfcBuildingStorey)	<i>Design > Story Settings</i>
CreatedBy	<i>Owning User of Owner History > Person /Organization</i> tab > <i>Addresses > Address type: Telecom > ElectronicMailAddress</i>	<i>(File > File Special > IFC 2x3 > IFC Options)</i>
CreatedOn	the <i>creation date</i> of the IFC file	
Category	<i>Classification Reference</i> data (<i>ItemReference : Name</i>) of an IfcBuildingStorey	<i>File > File Special > IFC 2x3 > IFC Manager</i>
ExtSystem	text: 'ArchiCAD-64'	
ExtObject	text: 'IfcBuildingStorey'	
ExtIdentifier	the <i>GlobalId</i> attribute of an IfcBuildingStorey	<i>(File > File Special > IFC 2x3 > IFC Manager)</i>
Description	the <i>Description</i> (or <i>LongName</i> or <i>Name</i>) attribute of an IfcBuildingStorey	<i>File > File Special > IFC 2x3 > IFC Manager</i>
Elevation	the <i>Elevation</i> attribute of an ArchiCAD Story	<i>(Design > Story Settings)</i>
Height	the <i>Height</i> attribute of an ArchiCAD Story	<i>(Design > Story Settings)</i>

Figure 7 Mapping between ArchiCAD model and the COBie2 **Floor** worksheet data

The “Floors” are interpreted as Stories in the ArchiCAD project. The story names (COBie “Name”), the elevation (COBie “Elevation”) and the height (COBie “Height”) can be defined in the *Story Settings* dialog (*Design > Story Settings*).

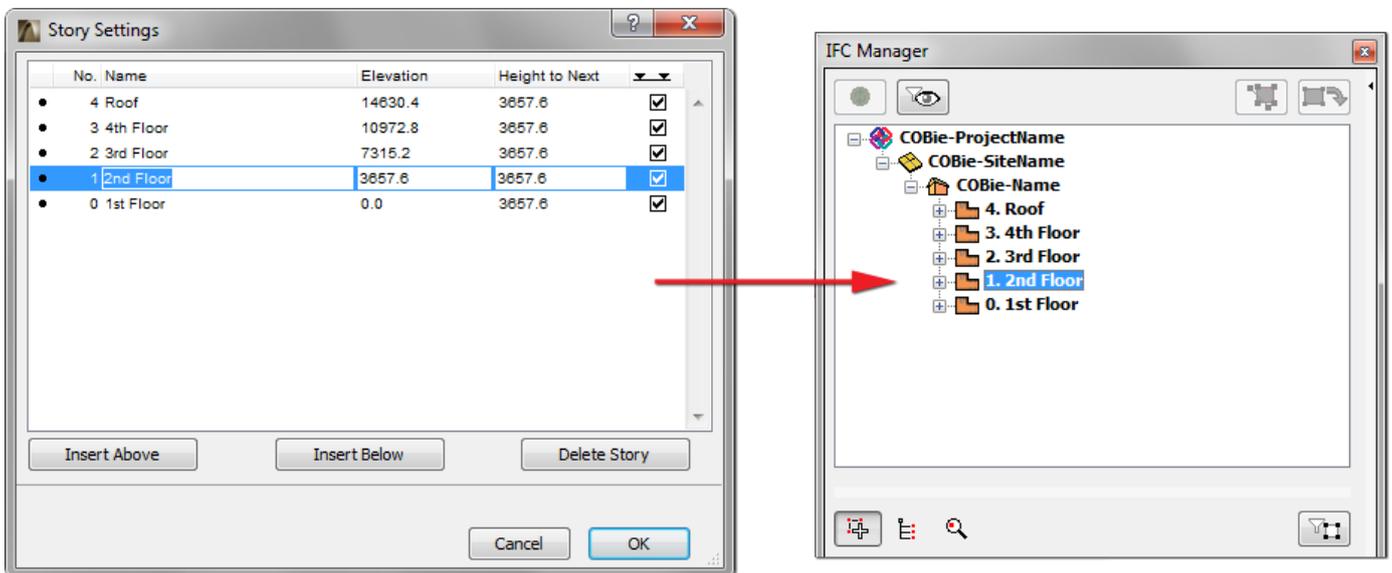


Figure 8 Story definition and its effect on the IFC model in ArchiCAD

To set the Facility “Category”, define Classification Reference data in the *IFC Manager*. COBie requires IfcBuildingStorey classification by the OmniClass table 11 called “Construction Entities by Function” in US or by the Uniclass system in UK. Both systems are available as built-in classification rules in ArchiCAD under the *Apply Predefined Rule* option in the *IFC Manager*.

Floor Category can be defined manually too. Apply the *Create Property/Classification* command to an IfcBuildingStorey item in the *IFC Manager*. The required classification “Name” and/or “ItemReference” data can be set in the Classification Reference dialog which opens by clicking the  button next to the name field of the new Classification Reference item.

The “Description” attribute of an ArchiCAD Story (IfcBuildingStorey) can also be set via the *IFC Manager*.

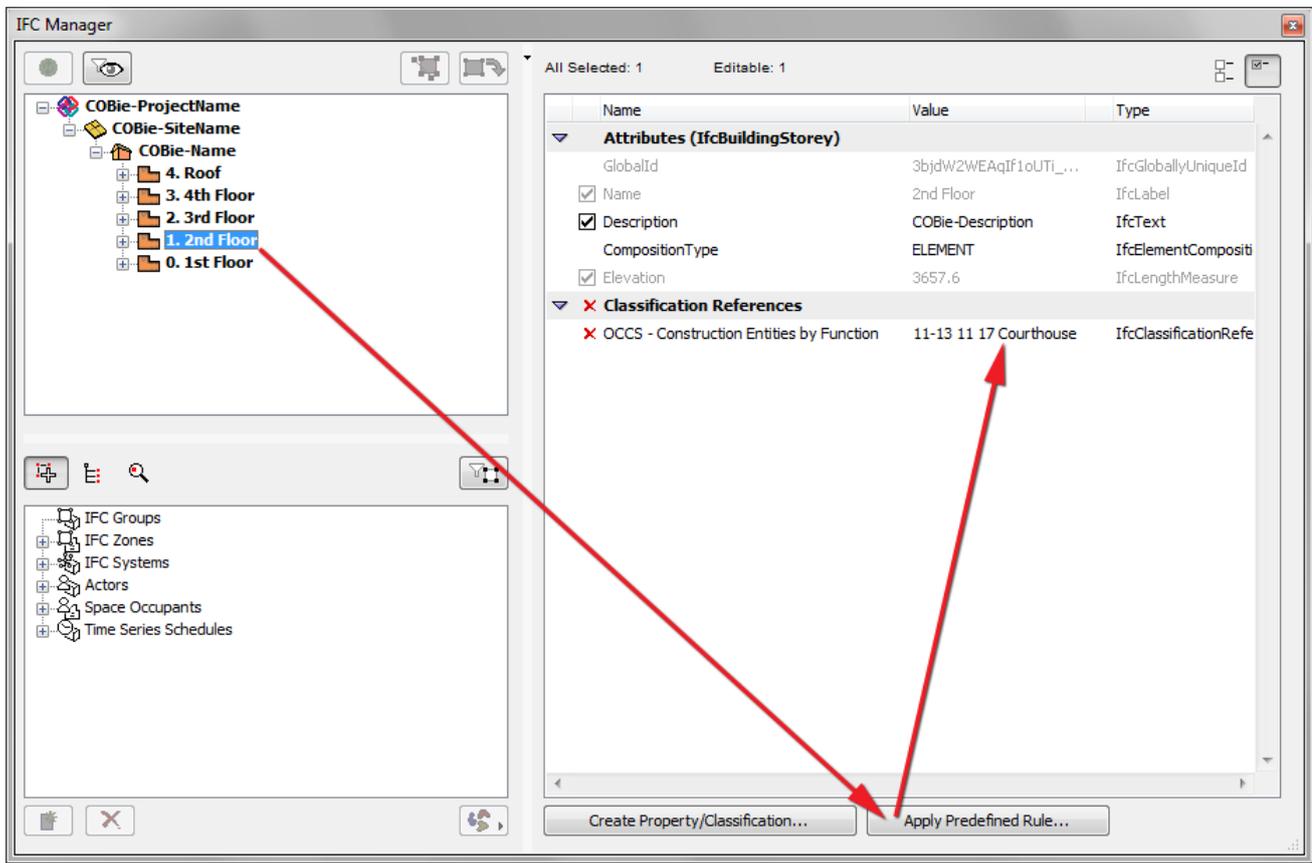


Figure 9 ArchiCAD Story data required as COBie Floor data

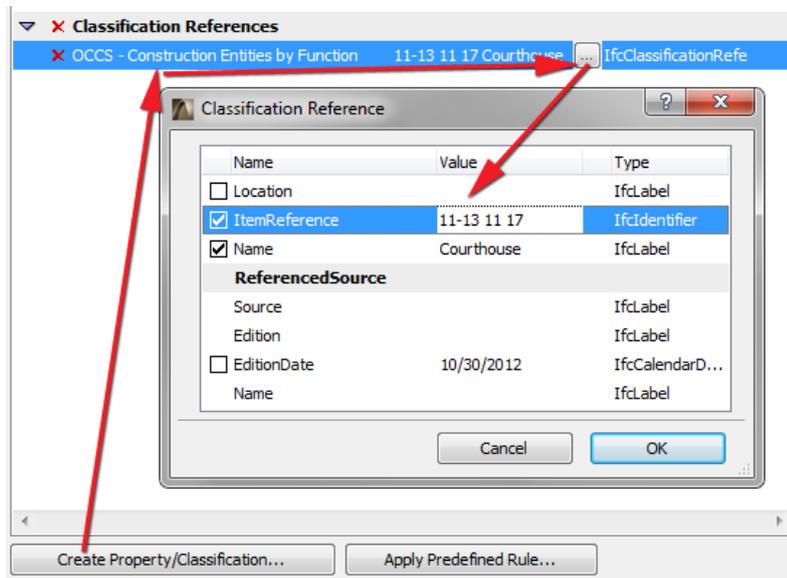


Figure 10 Manual method of Category definition in ArchiCAD

Space

The COBie2 **Space** worksheet summarizes data of the Spaces (IfcSpace) of the project.

Space	ArchiCAD (IFC) data mapped to COBie data	ArchiCAD command
COBie2 spreadsheet data		
Name	the No. attribute of an ArchiCAD Zone (IfcSpace)	Zone > Settings Dialog
CreatedBy	Owning User of Owner History > Person /Organization tab > Addresses > Address type: Telecom > ElectronicMailAddress	(File > File Special > IFC 2x3 > IFC Options)
CreatedOn	the creation date of the IFC file	
Category	Classification Reference data (ItemReference : Name) of an IfcSpace	File > File Special > IFC 2x3 > IFC Manager
FloorName	the Name attribute of an ArchiCAD Zone's Home Story	(Design > Story Settings)
Description	the Name attribute of an ArchiCAD Zone	Zone > Settings Dialog
ExtSystem	text: 'ArchiCAD-64'	
ExtObject	text: 'IfcSpace'	
ExtIdentifier	the GlobalId attribute of an IfcSpace	(File > File Special > IFC 2x3 > IFC Manager)
RoomTag	IFC Property Set: 'COBie_Space' > IFC Property: 'RoomTag'	Zone > Settings Dialog ,or File > File Special > IFC 2x3 > IFC Manager
UsableHeight	the Zone Height attribute	(Zone > Settings Dialog)
GrossArea	base quantity: GrossFloorArea	
NetArea	base quantity: NetFloorArea	

Figure 11 Mapping between ArchiCAD model and the COBie2 **Space** worksheet data

The “Spaces” are interpreted as Zones (IfcSpaces) in the ArchiCAD project. Thus, the COBie2-required data can be set in ArchiCAD Zone Settings. IFC data can be set using the *Manage IFC Properties* option (*Tags and Categories* tab).

“Name” and “Description” COBie2 items are derived from the “No.” and the “Zone Name” attributes of the ArchiCAD Zone. To set the Space “Category”, define Classification Reference data. COBie requires IfcSpace classification by the OmniClass table 13 called “Space by Function” in US or by the Uniclass system in UK. Both systems are available as built-in classification rules in ArchiCAD under the *Apply Predefined Rule* option.

Note Each Space has to have a unique COBie “Name” (ArchiCAD Zone “No.”). The Zone “No.” can be assigned or edited in the Zone Settings dialog box (*Name and Positioning* panel).

The COBie “RoomTag” data can be defined as custom IFC property in an ArchiCAD model. Although any custom IFC property can be defined with the *Create Property/Classification* tool, the COBie-required properties are available when using an IFC scheme template called “COBie2.xml” (available in the ArchiCAD’s *Default/ IFC Schemes* folder; see [COBie2 Scheme Template](#)).

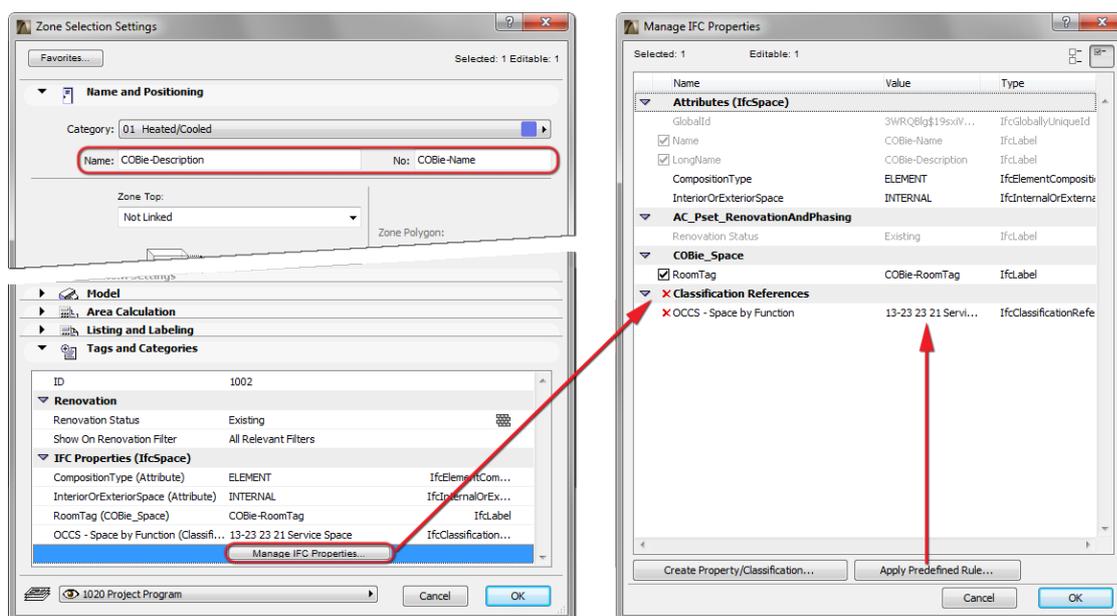


Figure 12 Space data in ArchiCAD

Zone

The COBie2 **Zone** worksheet summarizes the sets of spaces sharing a specific attribute in the project. In other words, it summarizes the data of the groups (IfcZones) of [COBie Spaces](#) (IfcSpaces).

Zone	ArchiCAD (IFC) data mapped to COBie data	ArchiCAD command
COBie2 spreadsheet data		
Name	the <i>Name</i> attribute of an IFC Zone	File > File Special > IFC 2x3 > IFC Manager
CreatedBy	Owning User of Owner History > Person / Organization tab > Addresses > Address type: Telecom > <i>ElectronicMailAddress</i>	(File > File Special > IFC 2x3 > IFC Options)
CreatedOn	the <i>creation date</i> of the IFC file	
Category	<i>Classification Reference</i> data (<i>ItemReference</i> : <i>Name</i>) of an IFC Zone	File > File Special > IFC 2x3 > IFC Manager
SpaceNames	the <i>No</i> attribute of the ArchiCAD Zones (IfcSpaces) assigned to an IFC Zone	(Zone > Settings Dialog)
ExtSystem	text: 'ArchiCAD-64'	
ExtObject	text: 'IfcZone'	
ExtIdentifier	the <i>GlobalId</i> attribute of an IFC Zone	(File > File Special > IFC 2x3 > IFC Manager)
Description	the <i>Description</i> attribute of an IFC Zone	File > File Special > IFC 2x3 > IFC Manager

Figure 13 Mapping between ArchiCAD model and the COBie2 **Zone** worksheet data

The “Zones” are interpreted as IFC Zone Assignment (IfcZone) entities in the ArchiCAD project. An IfcZone entity is a group of ArchiCAD Zone (IfcSpace) entities. Assignments (including IFC Zone) can be defined and managed only in the *IFC Manager*, so their COBie2-requested data can be defined with the *IFC Manager* too.

A COBie “Zone” (IfcZone) can be defined with the *New* command by applying it on the “IFC Zones” member of the “Assignments” tree. The “Name” attribute of the new IFC Zone defines the COBie “Name” data. Drag and drop the proper IfcSpace (ArchiCAD Zones) members from the IFC model hierarchy tree of the *IFC Manager* to the “New Relation” folder of the new IFC Zone entity.

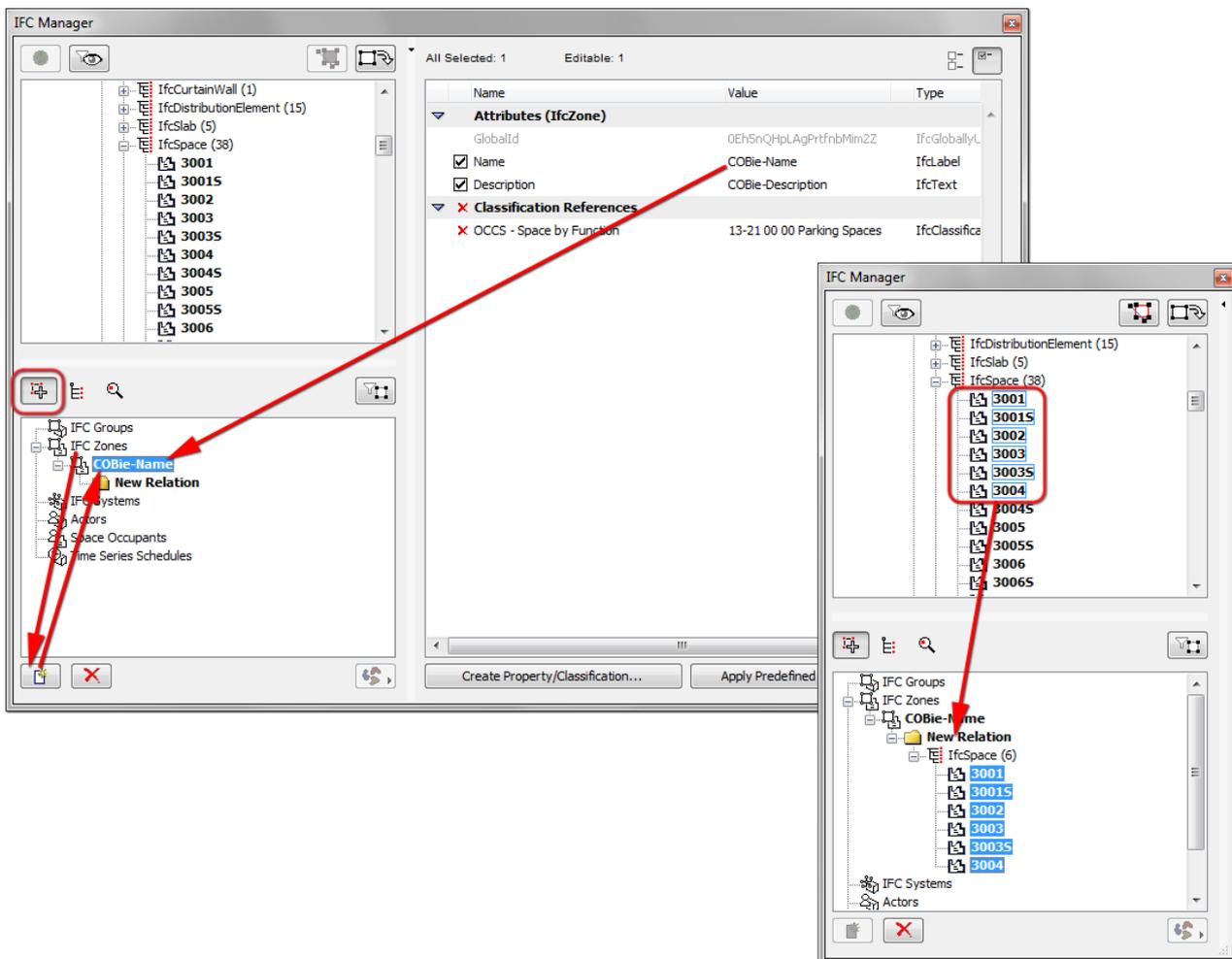


Figure 14 COBie2 **Zone** (IFC Zone) definition in the IFC Manager

To set the Zone “Category”, define Classification Reference data. COBie requires IfcZone classification by the OmniClass table 13 called “Space by Function” in US or by the Uniclass system in UK. Both systems are available as built-in classification rules in ArchiCAD under the *Apply Predefined Rule* option.

If other Zone “Category” definitions are required by the COBie documentation, apply the *Create Property/Classification* command to an IfcZone item in the *IFC Manager*. As an example, the definition of a “ZoneType” Classification Reference data with one of the following values for the “Name” attribute can be seen in the following figure:

- Circulation Zone
- Lighting Zone
- Fire Alarm Zone
- Historical Preservation Zone
- Occupancy Zone
- Ventilation Zone

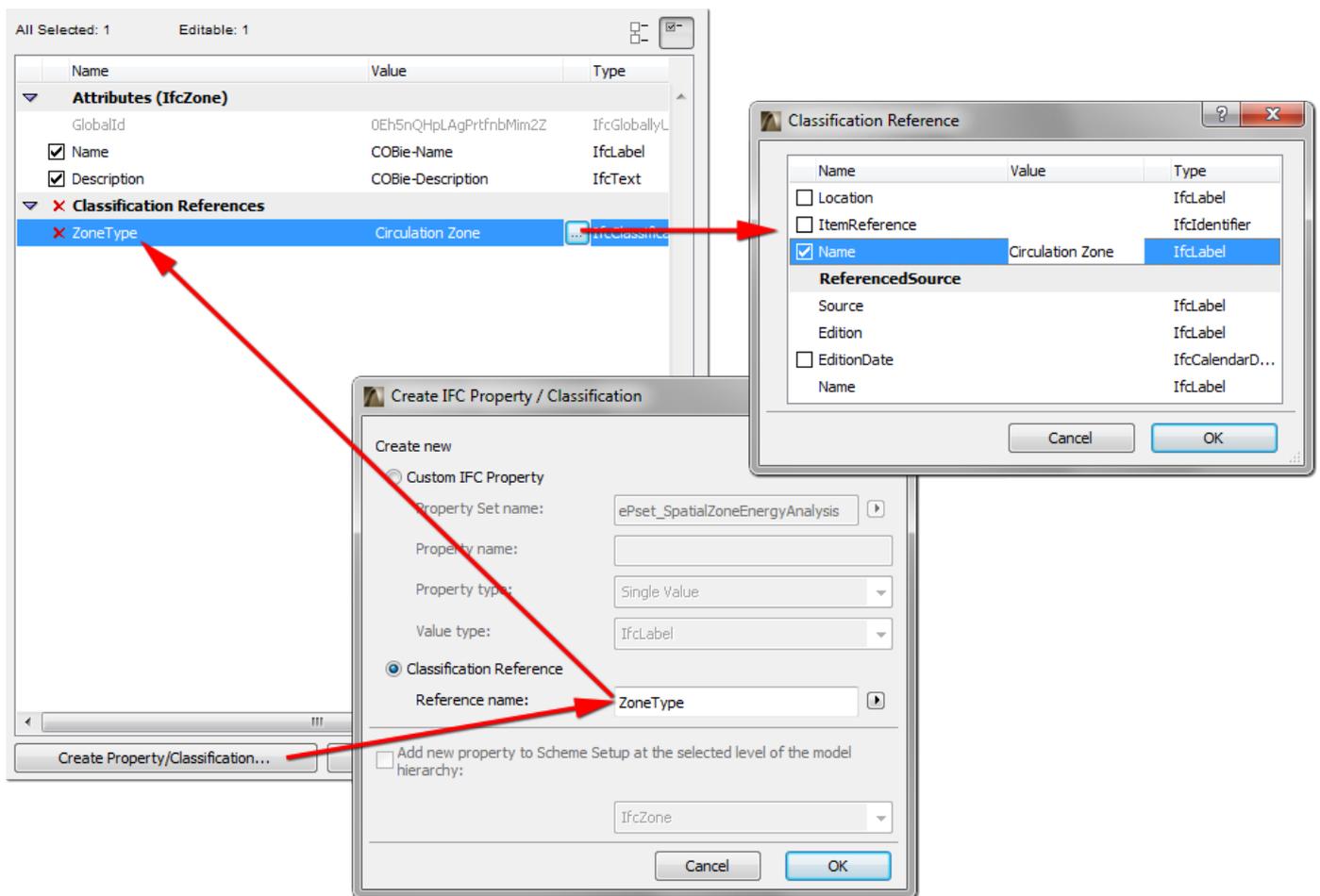


Figure 15 Custom (non-standard) Zone Category definition in the IFC Manager

Type

COBie2 **Type** worksheet summarizes the types of equipment and products.

Type COBie2 spreadsheet data	ArchiCAD (IFC) data mapped to COBie data	ArchiCAD command
Name	the <i>Name</i> attribute of an IFC Type Product	File > File Special > IFC 2x3 > IFC Manager
CreatedBy	Owning User of Owner History > Person / Organization tab > Addresses > Address type: Telecom > ElectronicMailAddress	{File > File Special > IFC 2x3 > IFC Options }
CreatedOn	the creation date of the IFC file	
Category	Classification Reference data (<i>ItemReference</i> : <i>Name</i>) of an IFC Type Product	File > File Special > IFC 2x3 > IFC Manager
Description	the <i>Description</i> attribute of an IFC Type Product	File > File Special > IFC 2x3 > IFC Manager
AssetType	IFC Property Set: ' <i>COBie_Asset</i> ' > IFC Property: ' <i>AssetType</i> '	File > File Special > IFC 2x3 > IFC Manager
Manufacturer	IFC Property Set: ' <i>Pset_ManufacturerTypeInfoInformation</i> ' > IFC Property: ' <i>Manufacturer</i> '	File > File Special > IFC 2x3 > IFC Manager
ModelNumber	IFC Property Set: ' <i>Pset_ManufacturerTypeInfoInformation</i> ' > IFC Property: ' <i>ModelLabel</i> '	File > File Special > IFC 2x3 > IFC Manager
WarrantyGuarantorParts	IFC Property Set: ' <i>COBie_Warranty</i> ' > IFC Property: ' <i>WarrantyGuarantorParts</i> '	File > File Special > IFC 2x3 > IFC Manager
WarrantyDurationParts	IFC Property Set: ' <i>COBie_Warranty</i> ' > IFC Property: ' <i>WarrantyDurationParts</i> '	File > File Special > IFC 2x3 > IFC Manager
WarrantyGuarantorLabor	IFC Property Set: ' <i>COBie_Warranty</i> ' > IFC Property: ' <i>WarrantyGuarantorLabor</i> '	File > File Special > IFC 2x3 > IFC Manager
WarrantyDurationLabor	IFC Property Set: ' <i>COBie_Warranty</i> ' > IFC Property: ' <i>WarrantyDurationLabor</i> '	File > File Special > IFC 2x3 > IFC Manager
WarrantyDurationUnit	Export Options tab > IFC model units > Options > <i>Time Unit</i>	File > File Special > IFC 2x3 > IFC Translation Setup
ExtSystem	text: ' <i>ArchiCAD-64</i> '	
ExtObject	text: the type of an IFC Type Product (for example: ' <i>IfcFurnishingElementType</i> ')	{File > File Special > IFC 2x3 > IFC Manager }
ExtIdentifier	the <i>GlobalId</i> attribute of an IFC Type Product	{File > File Special > IFC 2x3 > IFC Manager }
ReplacementCost	IFC Property Set: ' <i>COBie_EconomicImpactValues</i> ' > IFC Property: ' <i>ReplacementCost</i> '	File > File Special > IFC 2x3 > IFC Manager
ExpectedLife	IFC Property Set: ' <i>COBie_ServiceLife</i> ' > IFC Property: ' <i>ServiceLifeDuration</i> '	File > File Special > IFC 2x3 > IFC Manager
DurationUnit	Export Options tab > IFC model units > Options > <i>Time Unit</i>	File > File Special > IFC 2x3 > IFC Translation Setup
WarrantyDescription	IFC Property Set: ' <i>COBie_Warranty</i> ' > IFC Property: ' <i>WarrantyDescription</i> '	File > File Special > IFC 2x3 > IFC Manager
NominalLength	IFC Property Set: ' <i>COBie_Specification</i> ' > IFC Property: ' <i>NominalLength</i> '	File > File Special > IFC 2x3 > IFC Manager
NominalWidth	IFC Property Set: ' <i>COBie_Specification</i> ' > IFC Property: ' <i>NominalWidth</i> '	File > File Special > IFC 2x3 > IFC Manager
NominalHeight	IFC Property Set: ' <i>COBie_Specification</i> ' > IFC Property: ' <i>NominalHeight</i> '	File > File Special > IFC 2x3 > IFC Manager
ModelReference	IFC Property Set: ' <i>Pset_ManufacturerTypeInfoInformation</i> ' > IFC Property: ' <i>ModelReference</i> '	File > File Special > IFC 2x3 > IFC Manager
Shape	IFC Property Set: ' <i>COBie_Specification</i> ' > IFC Property: ' <i>Shape</i> '	File > File Special > IFC 2x3 > IFC Manager
Size	IFC Property Set: ' <i>COBie_Specification</i> ' > IFC Property: ' <i>Size</i> '	File > File Special > IFC 2x3 > IFC Manager
Color	IFC Property Set: ' <i>COBie_Specification</i> ' > IFC Property: ' <i>Color</i> '	File > File Special > IFC 2x3 > IFC Manager
Finish	IFC Property Set: ' <i>COBie_Specification</i> ' > IFC Property: ' <i>Finish</i> '	File > File Special > IFC 2x3 > IFC Manager
Grade	IFC Property Set: ' <i>COBie_Specification</i> ' > IFC Property: ' <i>Grade</i> '	File > File Special > IFC 2x3 > IFC Manager
Material	IFC Property Set: ' <i>COBie_Specification</i> ' > IFC Property: ' <i>Material</i> '	File > File Special > IFC 2x3 > IFC Manager
Constituents	IFC Property Set: ' <i>COBie_Specification</i> ' > IFC Property: ' <i>Constituents</i> '	File > File Special > IFC 2x3 > IFC Manager
Features	IFC Property Set: ' <i>COBie_Specification</i> ' > IFC Property: ' <i>Features</i> '	File > File Special > IFC 2x3 > IFC Manager
AccessibilityPerformance	IFC Property Set: ' <i>COBie_Specification</i> ' > IFC Property: ' <i>AccessibilityPerformance</i> '	File > File Special > IFC 2x3 > IFC Manager
CodePerformance	IFC Property Set: ' <i>COBie_Specification</i> ' > IFC Property: ' <i>CodePerformance</i> '	File > File Special > IFC 2x3 > IFC Manager
SustainabilityPerformance	IFC Property Set: ' <i>COBie_Specification</i> ' > IFC Property: ' <i>SustainabilityPerformance</i> '	File > File Special > IFC 2x3 > IFC Manager

Figure 16 Mapping between ArchiCAD model and the COBie2 **Type** worksheet data

The “Types” are interpreted as IFC Type Product entities in the ArchiCAD project. IFC Type Products and their COBie2-requested data can be defined in the *IFC Manager* only. ArchiCAD automatically generates IFC Type Product entities for all ArchiCAD element types. The following table shows some naming examples of the automatically generated IFC Type Products. Of course, the default values of the names can be modified manually with the *IFC Manager*.

ArchiCAD element (IFC Entity)	IFC Type Product	Derivation of "Name" Attribute of IFC Type Product
Column (IfcColumn)	IfcColumnType	Profile name and size
Beam (IfcBeam)	IfcBeamType	Profile name and size
Wall (IfcWall)	IfcWallType	Name of Cut Fill / Composite and thickness
Slab (IfcSlab)	IfcSlabType	Name of Cut Fill / Composite and thickness
Door (IfcDoor)	IfcDoorStyle	Name of the Library Part without .gsm extension
Window (IfcWindow)	IfcWindowStyle	Name of the Library Part without .gsm extension
Curtain Wall (IfcCurtainWall)	IfcCurtainWallType	"Curtain Wall Type" text
Curtain Wall > Panel element (IfcPlate)	IfcPlateType	Type and size of the CW panel element
Curtain Wall > Frame element (IfcMember)	IfcMemberType	Type and profile size of the CW frame element
GDL-based Objects	IfcFurnitureType, IfcRailingType, IfcRampFlightType, etc.	Name of the Library Part without .gsm extension

Figure 17 The default naming rule examples of IFC Type Product entities

For some object types, ArchiCAD considers other rules to define their IFC Type Product. For example, two windows defined from the same Library Part will be grouped in two separate IFC Type Products, if their size or their operation type (for example: “single swing right” or “single swing left”) differs.

To manage the required IFC attributes, properties and classification reference (COBie Category) items of an IFC Type Product (for example the properties of an `IfcWindowStyle` assigned to identical `IfcWindow` objects), first set the type object to editable with the *Edit/New Type* tool, and then define, set or modify the COBie-required properties.

Note Each Type has to have a unique COBie “Name” (“Name” attribute of IFC Type Product). When a [Component](#) is defined, this “Name” attribute is automatically generated based on the rules described above. If needed (e.g. if the automatically generated “Name” attribute is not unique), it can be modified in *IFC Manager*, after you have made this field editable.

If an IFC Type Product is editable, the following functions are available for it:

- renaming (modification of the “Name” attribute);
- setting, defining (new) or modifying IFC properties and classifications;
- deleting it by moving its all members (for example Windows) to another IFC Type Product (but of the same type: for example `IfcWindowStyle`);
- a member can be removed from the current IFC Type Product by moving it into a totally new or a currently available (but same type) IFC Type Product.

To make all COBie2-required IFC Properties available for the Type elements in the *IFC Manager*, use the “COBie2.xml” scheme in the ArchiCAD project (see [COBie2 Scheme Template](#)).

To set the Type “Category”, define Classification Reference data in the *IFC Manager*. COBie requires `IfcTypeProduct` classification by the OmniClass table 21 called “Elements” in US or by the Uniclass system in UK. Both systems are available as built-in classification rules in ArchiCAD under the *Apply Predefined Rule* option.

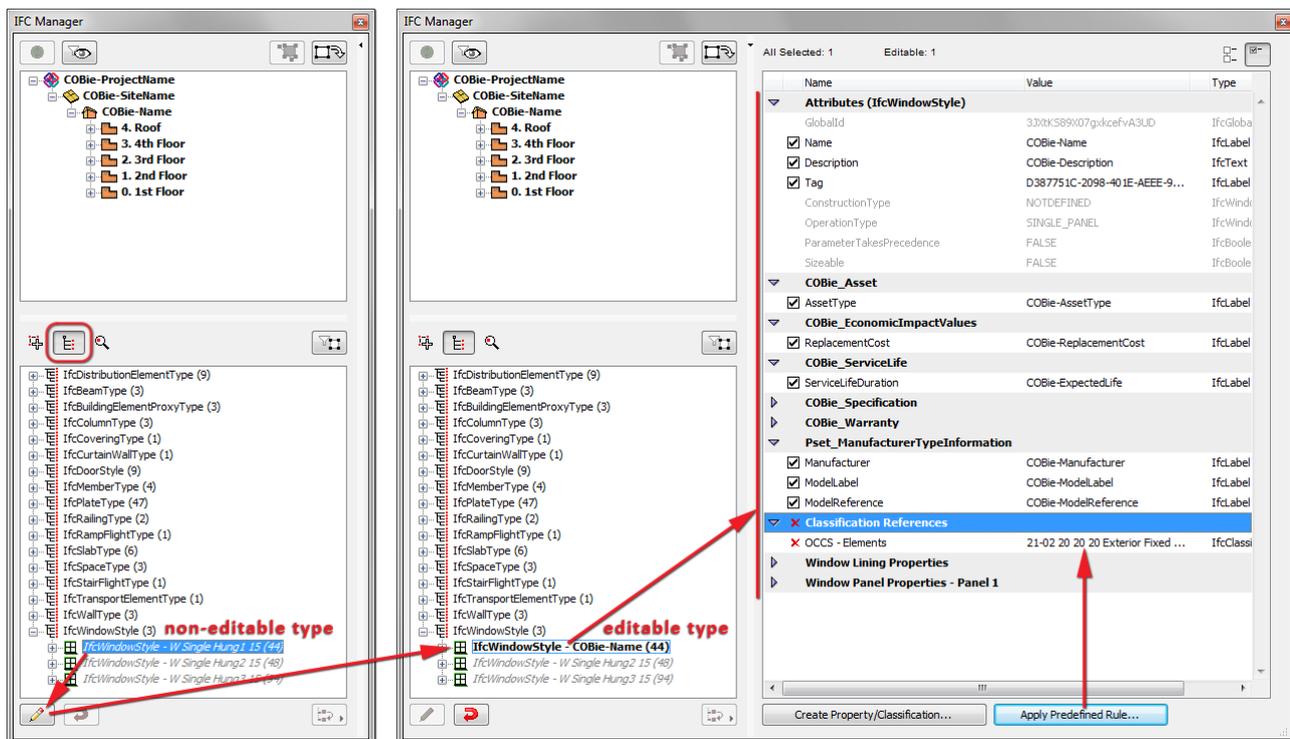


Figure 18 COBie-required IFC properties defined for an IFC Type Product entity

The COBie-required duration units can be set at the export options (*IFC Translation Setup*). There is a predefined settings package (so-called “IFC Translator” in ArchiCAD) which contains the export options (including the required time units) recommended for the COBie-required IFC export. It is called “Basic FM Handover View” IFC Translator (see chapter [COBie2-enabled IFC Model Export](#)).

Component

The COBie2 **Component** worksheet summarizes the individually named items of the project.

Component COBie2 spreadsheet data	ArchiCAD (IFC) data mapped to COBie data	ArchiCAD command
Name	the <i>ID</i> attribute of an ArchiCAD element	<i>Settings Dialog</i> of an ArchiCAD element
CreatedBy	<i>Owning User of Owner History</i> > <i>Person / Organization</i> tab > <i>Addresses</i> > Address type: <i>Telecom</i> > ElectronicMailAddress	(<i>File</i> > <i>File Special</i> > <i>IFC 2x3</i> > <i>IFC Options</i>)
CreatedOn	the <i>creation date</i> of the IFC file	
TypeName	the <i>Name</i> attribute of the IFC Type Product assigned to an ArchiCAD element	(<i>File</i> > <i>File Special</i> > <i>IFC 2x3</i> > <i>IFC Manager</i>)
Space	the <i>No</i> attribute of the ArchiCAD Zone (IfcSpace) assigned to an ArchiCAD element	
Description	the <i>Description</i> attribute of an IFC Type Product	<i>Settings Dialog</i> of an ArchiCAD element ,or <i>File</i> > <i>File Special</i> > <i>IFC 2x3</i> > <i>IFC Manager</i>
ExtSystem	text: ' <i>ArchiCAD-64</i> '	
ExtObject	text: the entity type of an ArchiCAD element (for example: ' <i>IfcFurnishingElement</i> ')	(<i>File</i> > <i>File Special</i> > <i>IFC 2x3</i> > <i>IFC Manager</i>)
ExtIdentifier	the <i>GlobalId</i> attribute of an IFC Type Product	(<i>File</i> > <i>File Special</i> > <i>IFC 2x3</i> > <i>IFC Manager</i>)
SerialNumber	IFC Property Set: ' <i>Pset_ManufacturerOccurrence</i> ' > IFC Property: ' <i>SerialNumber</i> '	<i>Settings Dialog</i> of an ArchiCAD element ,or <i>File</i> > <i>File Special</i> > <i>IFC 2x3</i> > <i>IFC Manager</i>
InstallationDate	IFC Property Set: ' <i>COBie_Component</i> ' > IFC Property: ' <i>InstallationDate</i> '	<i>Settings Dialog</i> of an ArchiCAD element ,or <i>File</i> > <i>File Special</i> > <i>IFC 2x3</i> > <i>IFC Manager</i>
WarrantyStartDate	IFC Property Set: ' <i>COBie_Component</i> ' > IFC Property: ' <i>WarrantyStartDate</i> '	<i>Settings Dialog</i> of an ArchiCAD element ,or <i>File</i> > <i>File Special</i> > <i>IFC 2x3</i> > <i>IFC Manager</i>
TagNumber	IFC Property Set: ' <i>COBie_Component</i> ' > IFC Property: ' <i>TagNumber</i> '	<i>Settings Dialog</i> of an ArchiCAD element ,or <i>File</i> > <i>File Special</i> > <i>IFC 2x3</i> > <i>IFC Manager</i>
BarCode	IFC Property Set: ' <i>Pset_ManufacturerOccurrence</i> ' > IFC Property: ' <i>BarCode</i> '	<i>Settings Dialog</i> of an ArchiCAD element ,or <i>File</i> > <i>File Special</i> > <i>IFC 2x3</i> > <i>IFC Manager</i>
AssetIdentifier	IFC Property Set: ' <i>COBie_Component</i> ' > IFC Property: ' <i>AssetIdentifier</i> '	<i>Settings Dialog</i> of an ArchiCAD element ,or <i>File</i> > <i>File Special</i> > <i>IFC 2x3</i> > <i>IFC Manager</i>

Figure 19 Mapping between ArchiCAD model and the COBie2 **Component** worksheet data

The “Name” data are derived from the ArchiCAD “ID” of the element, so you can set them in the element Settings dialogs.

Note Each Component has to have a unique COBie “Name” (ArchiCAD “ID”). If you did not assign unique (different) ID’s to your ArchiCAD elements, you can do so at any time, for example using the *Element ID Manager* function (*Document* > *Schedules and Lists*).

The “Space” data describes the ArchiCAD Zone (IfcSpace) assigned to a component. This data is automatically calculated, if the IFC export uses the *Space containment* and the *IFC Space boundaries* functions (see chapter [COBie2-enabled IFC Model Export](#)).

To make all COBie2-required IFC properties available for the Component elements in the element Settings dialog (*Tags and Categories* > *Manage IFC Properties*), use the “COBie2.xml” scheme in the ArchiCAD project (see [COBie2 Scheme Template](#)).

To set the Component “Category”, define Classification Reference data in the *IFC Manager*. COBie requires classification of Components (ArchiCAD elements) by the OmniClass table 21 called “Elements” in US or by the Uniclass system in UK. Both systems are available as built-in classification rules in ArchiCAD under the *Apply Predefined Rule* option.

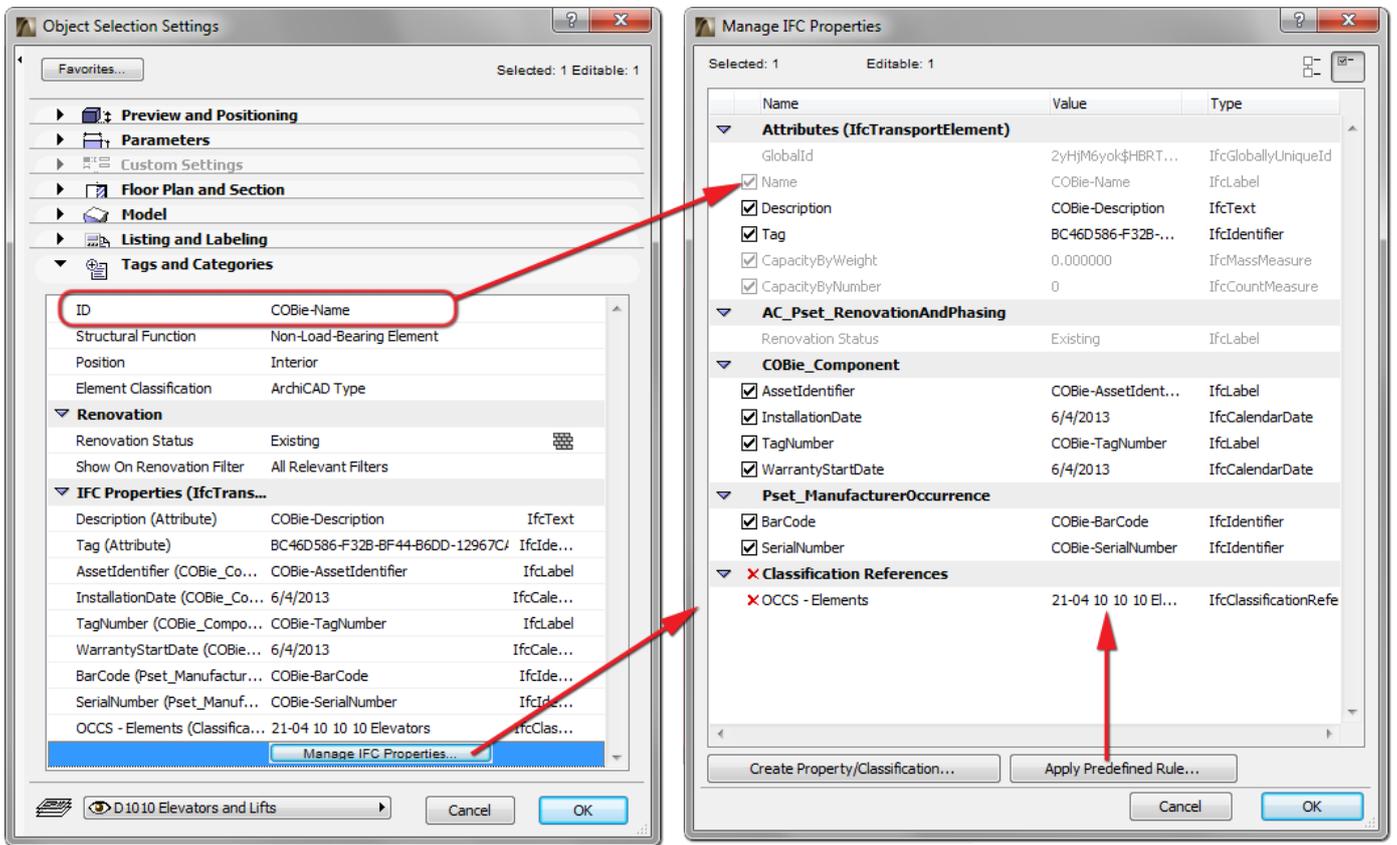


Figure 20 COBie-required IFC property definition in an element Settings dialog

System

The COBie2 **System** worksheet summarizes the sets of [Components](#) providing a service. In other words, it summarizes the data of the systems (IfcSystem) of the project elements.

System COBie2 spreadsheet data	ArchiCAD (IFC) data mapped to COBie data	ArchiCAD command
Name	the <i>Name</i> attribute of an IFC System	<i>File > File Special > IFC 2x3 > IFC Manager</i>
CreatedBy	<i>Owning User of Owner History > Person / Organization</i> tab > <i>Addresses > Address type: Telecom > ElectronicMailAddress</i>	<i>(File > File Special > IFC 2x3 > IFC Options)</i>
CreatedOn	the <i>creation date</i> of the IFC file	
Category	<i>Classification Reference</i> data (<i>ItemReference : Name</i>) of an IFC System	<i>File > File Special > IFC 2x3 > IFC Manager</i>
ComponentNames	the <i>ID</i> attribute of the ArchiCAD elements assigned to an IFC System	<i>(Settings Dialog</i> of an ArchiCAD element)
ExtSystem	text: 'ArchiCAD-64'	
ExtObject	text: 'IfcSystem'	
ExtIdentifier	the <i>GlobalId</i> attribute of an IFC System	<i>(File > File Special > IFC 2x3 > IFC Manager)</i>
Description	the <i>Description</i> attribute of an IFC System	<i>File > File Special > IFC 2x3 > IFC Manager</i>

Figure 21 Mapping between ArchiCAD model and the COBie2 **System** worksheet data

The “Systems” are interpreted as IFC System Assignment entities (IfcSystem) in the ArchiCAD project. Assignments (including IFC System) can be defined and managed only in the *IFC Manager*, so their COBie2-requested data can be defined with the *IFC Manager* too.

A COBie “System” (IfcSystem) can be defined with the *New* command by applying it on the “IFC Systems” member of the “Assignments” tree. The “Name” attribute of the new IFC System defines the COBie “Name” data. Drag and drop the proper ArchiCAD element (COBie Component) members from the IFC model hierarchy tree of the *IFC Manager* to the “New Relation” folder of the new IFC System entity.

To set the System “Category”, define Classification Reference data. COBie requires IfcSystem classification by the OmniClass table 21 called “Elements” in US or by the Uniclass system in UK. Both systems are available as built-in classification rules in ArchiCAD under the *Apply Predefined Rule* option.

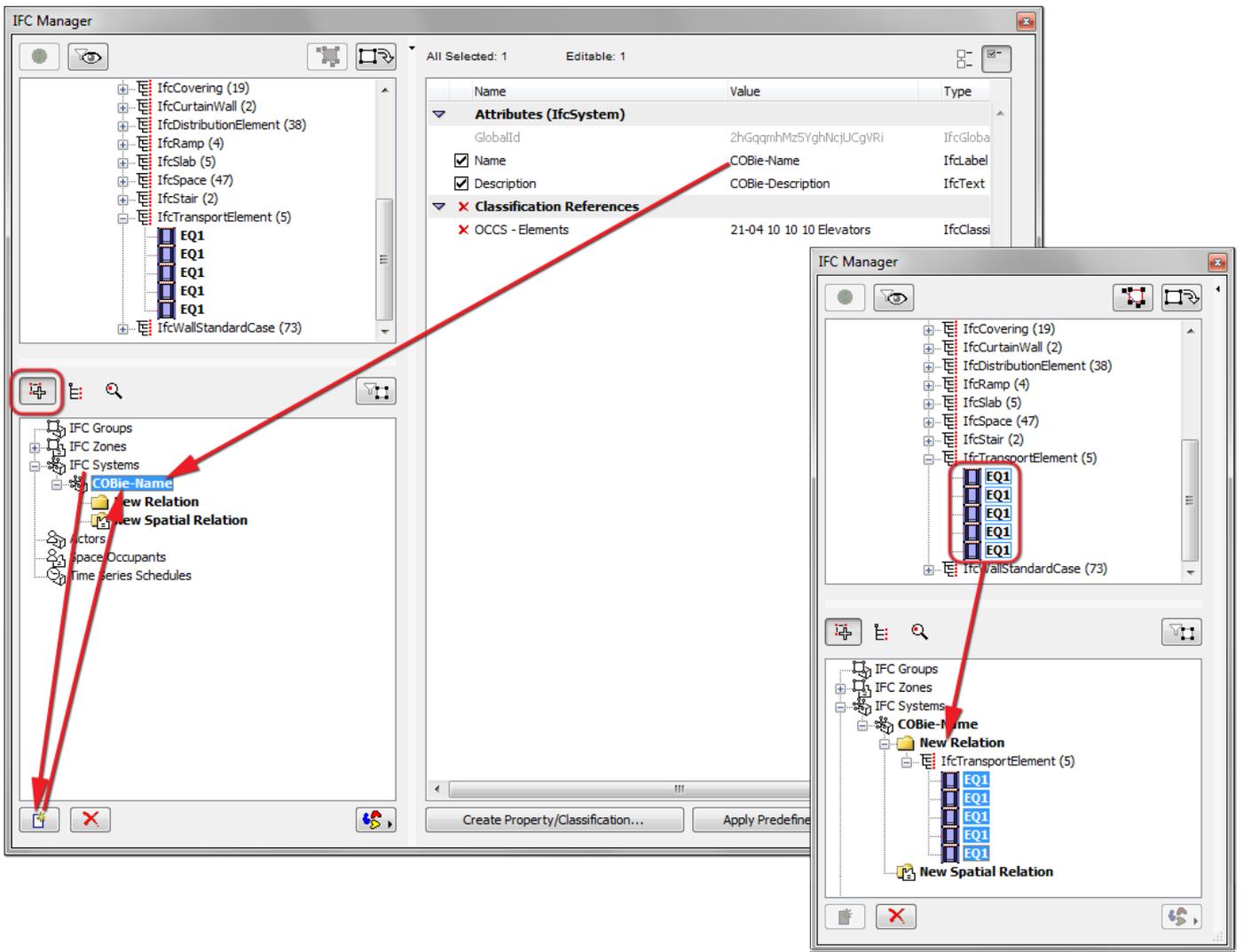


Figure 22 IFC System definition in the IFC Manager

MEP Systems defined with the [GRAPHISOFT MEP Modeler](#) Add-On can be also handled as IfcSystem inside an ArchiCAD project. Just create a new IfcSystem (as mentioned above) and choose the predefined MEP System name from the list available  (see the following figure).

If an IFC model (for example exported by an MEP application) merged to the current ArchiCAD project contains IfcSystems, you can also manage them and their properties in the *IFC Manager*.

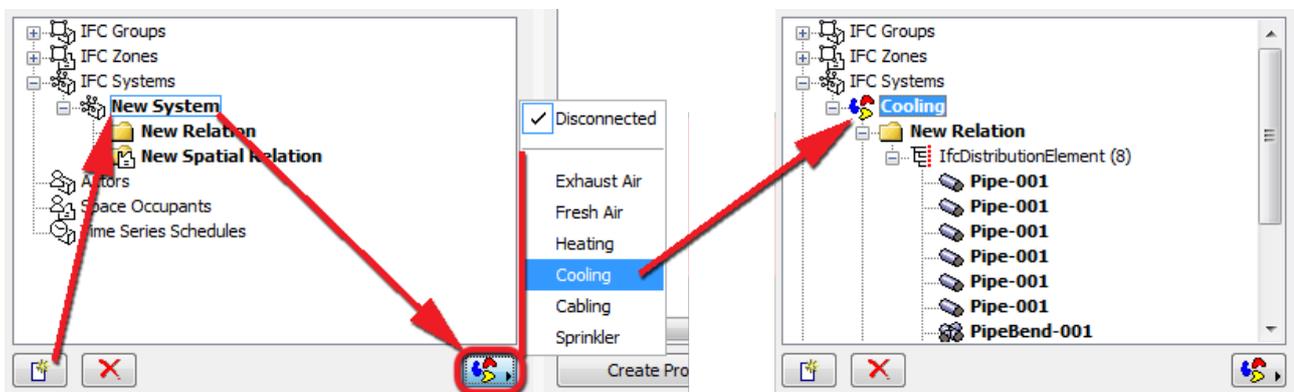


Figure 23 Conversion of a MEP Modeler System to an IFC System

Document / Attribute / Coordinate / PickLists

Data are extracted automatically from the IFC model exported by ArchiCAD.

Assembly / Connection / Spare / Resource / Job / Impact / Issue

These data types are not requested from a design application by the COBie2 rules, and they are not available in ArchiCAD projects either. The table contents should be manually filled out in the spreadsheet, if they are required.

COBie2 Scheme Template

To make all COBie2-required custom IFC properties available for the COBie [Space](#), [Type](#) and [Component](#) entities in the Setting Dialogs and in the *IFC Manager*, load the “COBie2.xml” scheme template file into the ArchiCAD project: use the *Merge* command for the .xml file in the *IFC Scheme Setup* dialog (*File > File Special > IFC 2x3*).

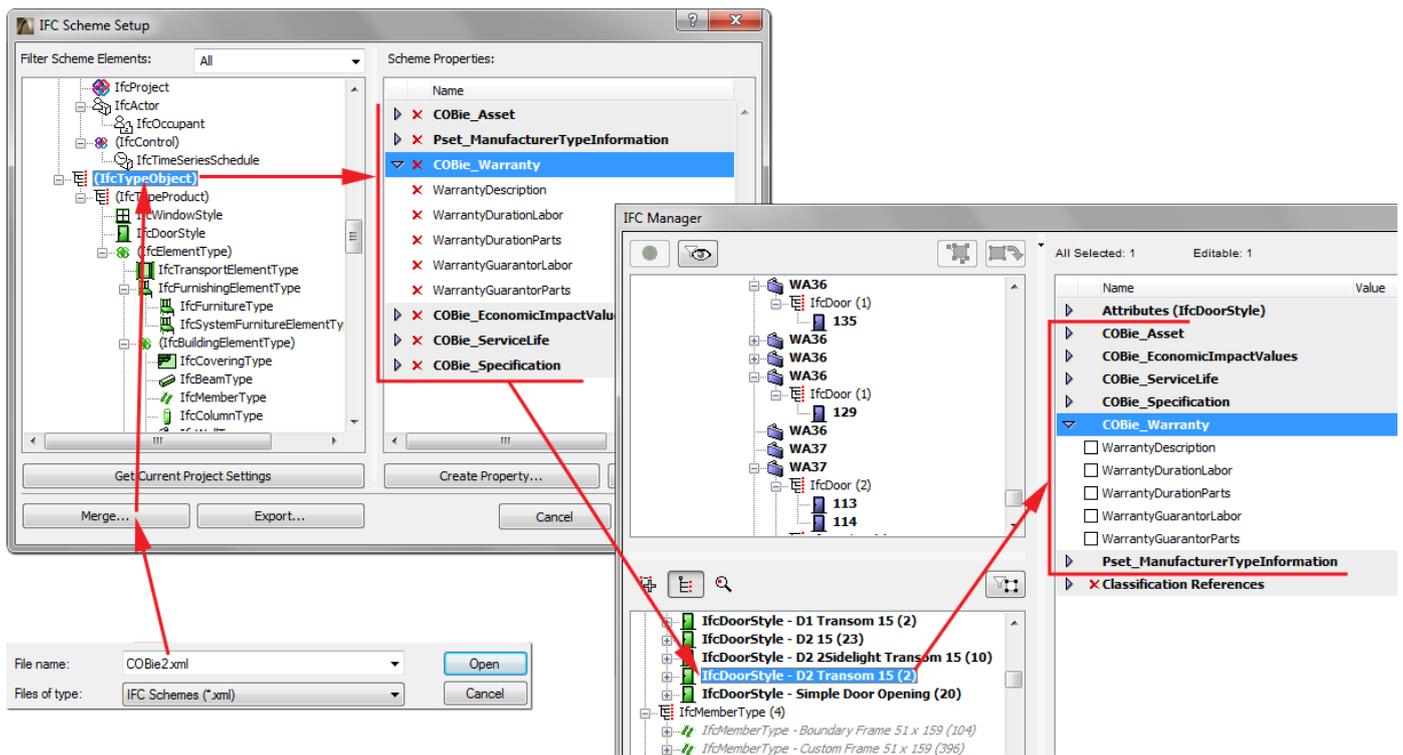


Figure 24 COBie-required properties loaded as a scheme template

COBie2-enabled IFC Model Export

COBie-required IFC model/file can be exported easily by using the export set (so-called “IFC Translator”) optimized for the Basic FM Handover View. Just use the *Save as* command (*File* menu) together with the translator called “Basic FM Handover View” from either a Floor Plan or a 3D window.

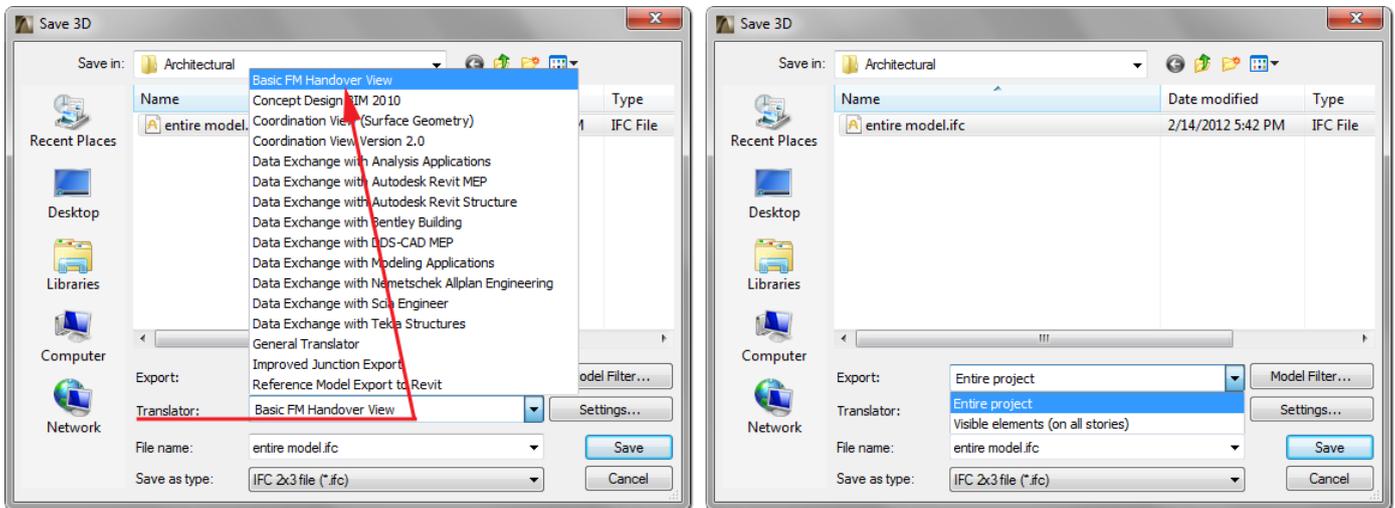


Figure 25 IFC model export based on Basic FM Handover View (COBie)

The steps of IFC model export:

1. Element filtering possibilities for the export:

- *Selected elements only* (available only if elements have been selected):
elements selected in the current view (the view that was open when you issued the export command) will be exported.
 - *Entire project*:
entire model (regardless of any selection, and regardless of the elements' show/hide status) will be exported.
 - *Visible elements (on all stories)*:
the visible elements in the current view will be exported, regardless of any selection. “Visible” means all elements that are set to be displayed (due to layer settings, model view options, partial structure display, etc.).
- Note** If you issue the export command from Floor Plan view (“Visible elements (on all stories)”), this choice includes all elements currently displayed on every story of the project.
- *All elements on current story* (available only if Floor Plan is open):
all elements (regardless of any selection, and regardless of the elements' show/hide status) on the current story of the Floor Plan will be exported.
 - *Visible elements on current story* (available only if Floor Plan is open):
all elements (regardless of any selection) that are visible on the current story of the Floor Plan will be exported.

Note If you choose “Visible elements,” make sure that ArchiCAD Zones are set to be displayed in the current view. For example, if you are saving from the 3D window, make sure that Zones are “on” in the *Filter and Cut Elements in 3D* dialog box (*View > Elements in 3D View*).

- Choose the “Basic FM Handover View” Translator, in which export settings are fine-tuned for the FM Handover requirements.

Note The meaning of the “Derived model data to export” options (*IFC Translation Setup > Export Options*):

- *Space containment*:
It exports the relationship between ArchiCAD Zones (IfcSpaces) and their contained Object (Furnishing, Mechanical (HVAC), etc.) and Morph elements. “Contained” means that the middle point of an Object or Morph is within an ArchiCAD Zone in the 3D space. This option is required for exporting COBie “Space” data of the [Component](#) worksheet.
- *Base quantities (length, area and volume)*:
It exports elements’ base quantities required by COBie2.
- *IFC Space boundaries with tolerance between Zones [mm]*:
It exports the logical connection between ArchiCAD Zones (IfcSpace) and the building elements that enclose them. The “tolerance between Zones” means the maximum distance between neighboring ArchiCAD Zones (for example, the thickest wall/slab) in mm. This option is required for exporting COBie “Space” data of the [Component](#) worksheet.

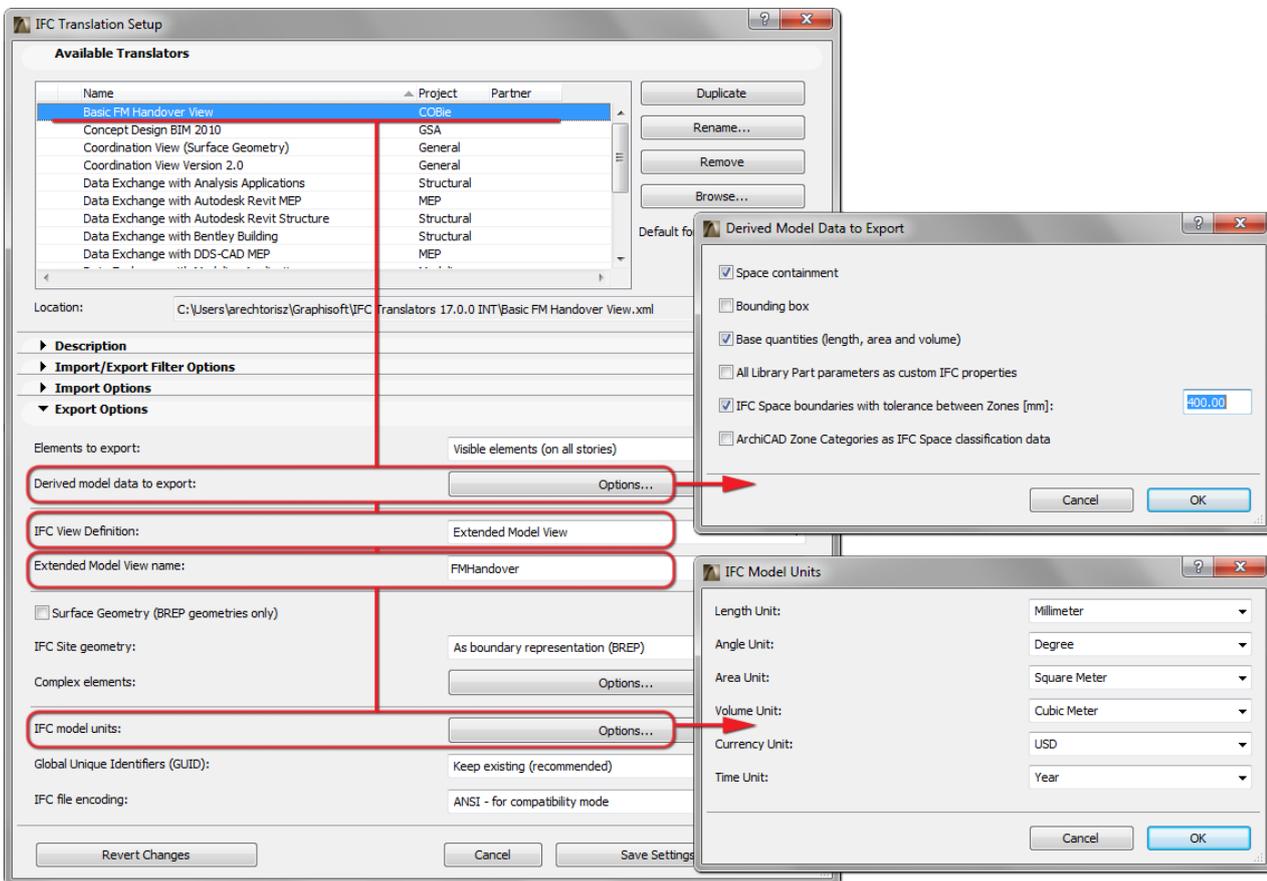


Figure 26 Major export options of the “Basic FM Handover View” (COBie) IFC translator

- Define file name.
- Choose the file format of the IFC export. Choose .IFC or .IFCXML depending on the file support of the COBie2 spreadsheet converter programs (see the [How to Create a COBie2 Spreadsheet](#) chapter).
- Click Save.

How to Create a COBie2 Spreadsheet

An external application is needed to convert an ArchiCAD IFC file to an XLS/XML-type COBie2 spreadsheet format.

The IFC, IFCXML and COBie2 spreadsheet formats for the IFC 2x3 Basic FM Handover MVD do capture the same information content and can be transformed forth and back across the different formats. A number of dedicated tools can be used to execute the transformations, such as the free COBie Toolkit application, developed by Engineer Research and Development Center (ERDC).

ERDC COBie Toolkit, developed for the COBie FM Handover project, includes the transformer tool and the configurations to map IFC data to COBie2. The application also checks for any missing items in your IFC model. The conversion can be done in two easy steps (1. IFC file selection and 2. COBie output file type selection).

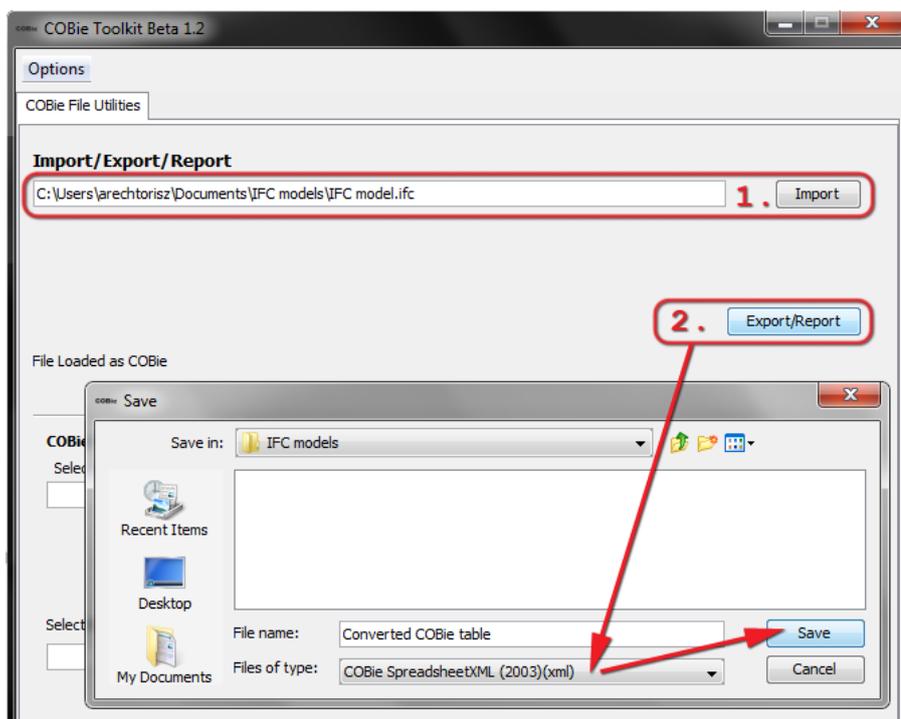


Figure 27 The steps of IFC to COBie conversion

Hint COBie Toolkit is a free tool and can be downloaded from [here](#) or from the following website:

<https://github.com/opensourceBIM/COBie-plugins>