

# IFC

## Integrating Building Information Modeling

# Agenda

- IFC - the 'glue' of BIMs
- Bentley's support of IFC, including IFC2x3 psets
  - export
  - import
  - open/reference
- Limitations of IFC
- Benefits of IFC

# IFC (Industry Foundation Classes)

- Information Model schema for exchange of data
- semantic information of the model
  - geometry
- interoperability (IAI)
- project and maintenance
  - process maps, exchange requirements, MVD
  - implementer support (ISG), certification, ...

**prerequisite for improving  
Integrated Project Delivery  
using BIM methods**

# IFC - Objectives

- Coordination View
  - cross-discipline coordination of building information models
- Add-on Views
  - e.g. QTO, COBie2, FM Handover, CDB-2010, ATC-75, ...
  - interoperability across IFC-compliant BIM applications
  - re-use of data for analyses and other downstream tasks



# export IFC

extend workspace with IFC2x3 property sets

# IFC2x3 Property Sets

- >300 object property sets, names and formats defined by buildingSMART

- Browsing documentation by:**
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**Alphabetical List**

- [PSD Alphabetical Index \(317\)](#)

**Core Layer**

- [IfcKernel](#)
- [IfcControlExtension](#)
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- [Pset\\_DistributionChamberEle](#)
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- [Pset\\_ElectricDistributionPoint](#)

## IFC2x3 Property Set Definition Reference

**PropertySet Definition:**

<b>PropertySet Name</b>	Pset_DoorCommon
<b>Applicable Entities</b>	<a href="#">IfcDoor</a>
<b>Applicable Type Value</b>	
<b>Definition</b>	Definition from IAI: Properties common to the definition of all occurrences of IfcDoor.

**Property Definitions:**

Name	Property Type	Data Type	Definition
Reference	IfcPropertySingleValue	IfcIdentifier	Reference ID for this specified type in this project (e.g. type 'A-1')
FireRating	IfcPropertySingleValue	IfcLabel	Fire rating for this object. It is given according to the national fire safety classification.
AcousticRating	IfcPropertySingleValue	IfcLabel	Acoustic rating for this object. It is giving according to the national building code. It indicates the sound transmission resistance of this object by an index ration (instead of providing full sound absorbtion values).
SecurityRating	IfcPropertySingleValue	IfcLabel	Index based rating system indicating security level. It is giving according to the national building code.
IsExternal	IfcPropertySingleValue	IfcBoolean	Indication whether the element is designed for use in the exterior (TRUE) or not (FALSE). If (TRUE) it is an external element and faces the outside of the building.
Infiltration	IfcPropertySingleValue	IfcVolumetricFlowRateMeasure / VOLUMETRICFLOWRATEUNIT	Infiltration flowrate of outside air for the filler object based on the area of the filler object at a pressure level of 50 Pascals. It shall be used, if the length of all joints is unknown.
ThermalTransmittance	IfcPropertySingleValue	IfcThermalTransmittanceMeasure / THERMALTRANSMITTANCEUNIT	Thermal transmittance coefficient (U-Value) of a material. It applies to the total door construction.
GlazingAreaFraction	IfcPropertySingleValue	IfcPositiveRatioMeasure	Fraction of the glazing area relative to the total area of the filling element. It shall be used, if the glazing area is not given separately for all panels within the filling element.
Handicap.Accessible	IfcPropertySingleValue	IfcBoolean	Indication that this object is designed to be accessible by the handicapped. It is giving according to the requirements of the national building code.
FireExit	IfcPropertySingleValue	IfcBoolean	Indication whether this object is designed to serve as an exit in the case of fire (TRUE) or not (FALSE). Here it defines an exit door in accordance to the national building code.
SelfClosing	IfcPropertySingleValue	IfcBoolean	Indication whether this object is designed to close automatically after use (TRUE) or not (FALSE).
SmokeStop	IfcPropertySingleValue	IfcBoolean	Indication whether the object is designed to provide a smoke stop (TRUE) or not (FALSE).

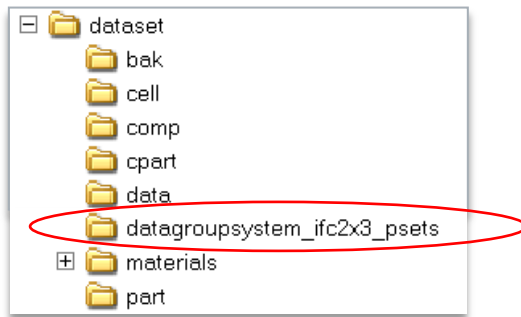


# IFC2x3 Property Sets

- >300 object property sets, names and formats defined by buildingSMART
- delivered as 'IFC2x3\_pset\_DatasetExtension.zip'
  - IFC2x3 specific DataGroup files
  - quick reference guide
- download from SELECTservices under 'Enhancements and Updates'
- added to project dataset or dataset extension
- non-common properties supported via DataGroup edits

# IFC2x3\_pset\_DatasetExtension

- IFC2x3 pset folders added to DataGroup system:
  - either to project dataset (for individual projects)

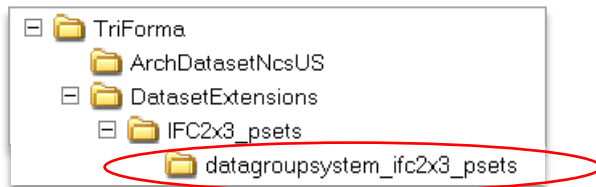


- configuration variable to be added to pcf-file:

```
#-----  
# Add search path to support the IFC2x3 property sets  
#-----  
DG_PATH > $(PROJ_DATASET)datagroupsystem_ifc2x3_psets/
```

# IFC2x3\_pset\_DatasetExtension

- IFC2x3 pset folders added to DataGroup system:
  - or dataset-independent folder (for selected projects)

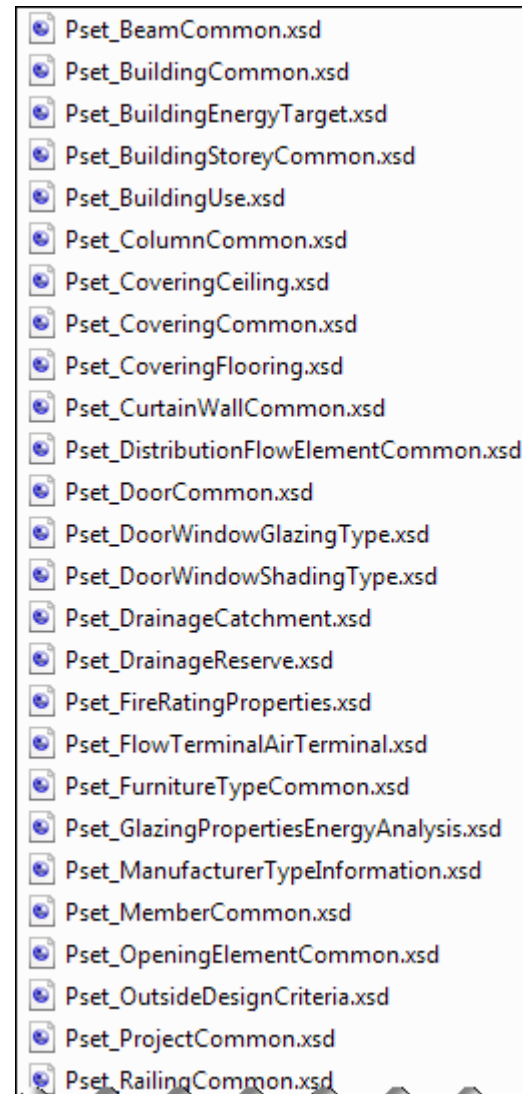


- configuration variables to be added to each pcf-file:

```
#-----  
# Add search paths to support the IFC2x3 property sets  
#-----  
IFC_PSETS = $(TF_DATASETS)DatasetExtensions/IFC2x3_psets/  
DG_PATH   = $(IFC_PSETS)datagroupsystem_ifc2x3_psets/
```

# IFC2x3\_pset\_DatasetExtension

- DataGroup definition files added to Building workspace



- Browsing documentation by:
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- [Pset\\_DuctSilencerTypeCommon](#)
- [Pset\\_ElectricalCircuit](#)
- [Pset\\_ElectricalDeviceCommon](#)
- [Pset\\_ElectricDistributionPoint](#)

## IFC2x3 Property Set Definition Reference

### PropertySet Definition:

PropertySet Name	Pset_DoorCommon
Applicable Entities	IfcDoor
Applicable Type Value	
Definition	Definition from IAI: Properties common to the definition of a

### Property Definitions:

Name	Property Type	Property Value
Reference	IfcPropertySingleValue	IfcIdentif...
FireRating	IfcPropertySingleValue	IfcLabel
AcousticRating	IfcPropertySingleValue	IfcLabel
SecurityRating	IfcPropertySingleValue	IfcLabel
IsExternal	IfcPropertySingleValue	IfcBoolea..
Infiltration	IfcPropertySingleValue	IfcVolumetricFlowRateMeasure /
ThermalTransmittance		exterior (TRUE) or not (FALSE). If (TRUE) it is an external element and faces the outside of the building.
GlazingAreaFraction		Infiltration flowrate of outside air for the filler object based on
HandicapAccessible		
FireExit		
SelfClosing		
SmokeStop		

```
<?xml version="1.0" encoding="Windows-1252"?>
<xs:schema elementFormDefault="qualified" attributeFormDefault="unqualified" xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="Pset_DoorCommon">
    <xs:complexType>
      <xs:attribute name="Reference" type="xs:string" use="optional" default=""/>
      <xs:attribute name="FireRating" type="xs:string" use="optional" default=""/>
      <xs:attribute name="AcousticRating" type="xs:string" use="optional" default=""/>
      <xs:attribute name="SecurityRating" type="xs:string" use="optional" default=""/>
      <xs:attribute name="IsExternal" type="xs:boolean" use="optional" default="false"/>
      <xs:attribute name="Infiltration" type="xs:decimal" use="optional" default="0"/>
      <xs:attribute name="ThermalTransmittance" type="xs:decimal" use="optional" default="0"/>
      <xs:attribute name="GlazingAreaFraction" type="xs:decimal" use="optional" default="0"/>
      <xs:attribute name="HandicapAccessible" type="xs:boolean" use="optional" default="false"/>
      <xs:attribute name="FireExit" type="xs:boolean" use="optional" default="false"/>
      <xs:attribute name="SelfClosing" type="xs:boolean" use="optional" default="false"/>
      <xs:attribute name="SmokeStop" type="xs:boolean" use="optional" default="false"/>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

DataGroup Definition Editor for IFC2x3\_pset\_test

File Edit View Insert

- Pset\_BeamCommon
- Pset\_BuildingCommon
- Pset\_BuildingEnergyTarget
- Pset\_BuildingStoreyCommon
- Pset\_BuildingUse
- Pset\_ColumnCommon
- Pset\_CoveringCeiling
- Pset\_CoveringCommon
- Pset\_CoveringFlooring
- Pset\_CurtainWallCommon
- Pset\_DistributionFlowElementComm
- Pset\_DoorCommon
  - AcousticRating
  - FireExit
  - FireRating
  - GlazingAreaFraction
  - HandicapAccessible
  - Infiltration
  - IsExternal
  - Reference
  - SecurityRating
  - SelfClosing
  - SmokeStop

Property	Value
Name	FireExit
Display name	Fire Exit
Data type	Boolean
Default value	<input type="checkbox"/>

# IFC2x3\_pset\_DatasetExtension

- IFC2x3 pset DataSet definitions

The screenshot shows the 'DataGroup Catalog Editor for IFC2x3\_pset\_test (Catalog Types)' window. The 'Definition' pane shows the following paths:

- C:\Program Files (x86)\Bentley\MicroStation V8i (SELECTseries 1)\TriForma\datagrousystem\ArchDoor.xsd
- C:\ProgramData\...\Workspace\triforma\ArchDatasetUniclassGB\_noprefix\datagrousystem\Door.xsd
- C:\ProgramData\...\IFC2x3\_pset\_test\dataset\datagrousystem\_ifc2x3\_psets\Pset\_DoorCommon.xsd

The main table displays the following properties:

ID	Name	Value	Editable	Hidden
31504	ArchDoor	BXF		
31505	ArchDoor	31101		
31506	ArchDoor	1800		
31507	ArchDoor	2100		
32501	Door	90		
32502	Door	Frame Depth		
32503	Door	Frame Depth Match Wall	<input type="checkbox"/>	
32504	Door	Frame Thickness	25	
32505	Door	Leaf Thickness	38	
32506	Door	ID		
32507	Door	Door Finish		
32508	Door	Under Cut		
32509	Door	Hardware Set Type		
32510	Door	Hardware Set Name		
32511	Door	Hardware Set Model Number		
32512	Door	Door Material	Metal	
32513	Door	Frame Material	Metal	
32514	Door	Door Manufacturer		
32515	Door	Door Model Number		
32516	Door	Notes		
32517	Pset_DoorCommon	Reference		
32518	Pset_DoorCommon	Fire Rating		
32519	Pset_DoorCommon	Acoustic Rating		
32520	Pset_DoorCommon	Security Rating		
	Pset_DoorCommon	Is External	<input type="checkbox"/>	
	Pset_DoorCommon	Infiltration	0	
	Pset_DoorCommon	ThermalTransmittance	0	
	Pset_DoorCommon	Glazing Area Fraction	0	
	Pset_DoorCommon	Handicap Accessible	<input type="checkbox"/>	
	Pset_DoorCommon	Fire Exit	<input type="checkbox"/>	
	Pset_DoorCommon	Self Closing	<input type="checkbox"/>	
	Pset_DoorCommon	Smoke Stop	<input type="checkbox"/>	

# IFC2x3\_pset\_DatasetExtension

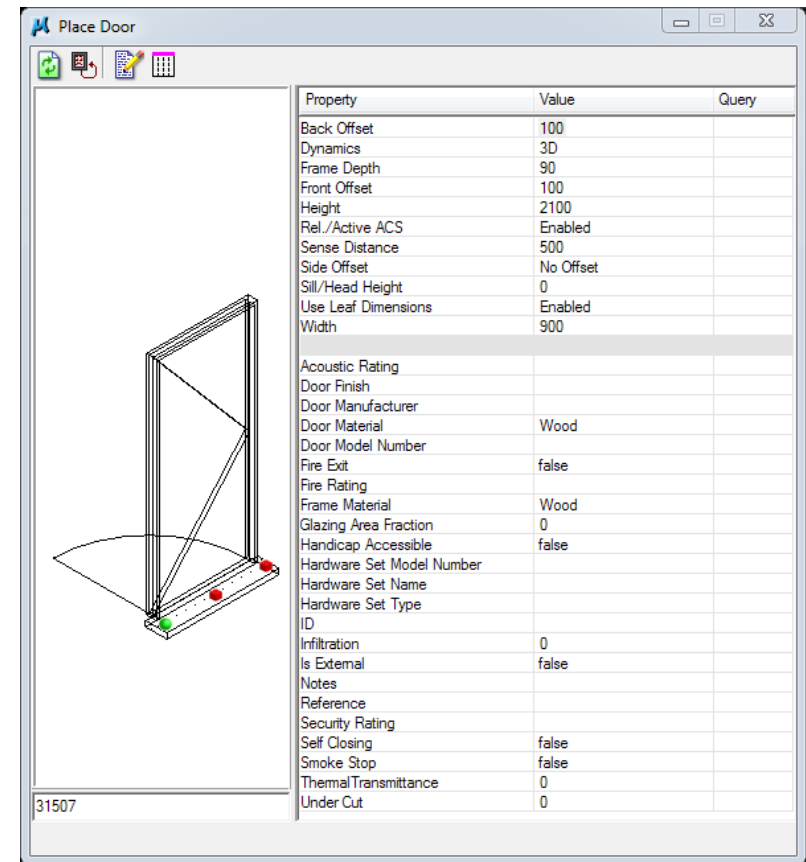
- IFC2x3 pset DataGroup definitions
  - attachments in ifc\_pset\_catalogtypeexts.xml
  - only Pset\_XxxxxCommon activated

```
</CustomCatalogTypes>
<!--
Note: all property sets (InstanceDataDefinitions) except the 'common' ones, are commented out, i.e. will not be used.
To attach an InstanceDataDefinition, do one of the following:
- use the DataGroup Catalog Editor (Catalog Types) tool, or
- uncomment the line(s) by deleting the comment-characters before and after the line as necessary
Caution: syntax errors corrupt the DataGroup system; backup files before editing!
-->
<CatalogTypeExtensions>
  <CatalogTypeExtension type="Concrete Beam">
    <InstanceDataDefinition defType="USER" definition="Pset_BeamCommon"/>
    <!-- InstanceDataDefinition defType="USER" definition="Pset_ReinforcementBarPitchOfBeam"/> -->
  </CatalogTypeExtension>
  <CatalogTypeExtension type="Steel Beam">
    <InstanceDataDefinition defType="USER" definition="Pset_BeamCommon"/>
  </CatalogTypeExtension>
  <CatalogTypeExtension type="BaseCasework">
    <InstanceDataDefinition defType="USER" definition="Pset_FurnitureTypeCommon"/>
  </CatalogTypeExtension>
  <CatalogTypeExtension type="Building">
    <InstanceDataDefinition defType="USER" definition="Pset_BuildingCommon"/>
    <!-- InstanceDataDefinition defType="USER" definition="Pset_BuildingUse"/> -->
    <!-- InstanceDataDefinition defType="USER" definition="Pset_BuildingEnergyTarget"/> -->
    <!-- InstanceDataDefinition defType="USER" definition="Pset_OutsideDesignCriteria"/> -->
  </CatalogTypeExtension>
  <CatalogTypeExtension type="Ceiling">
    <InstanceDataDefinition defType="USER" definition="Pset_CoveringCommon"/>
    <!-- InstanceDataDefinition defType="USER" definition="Pset_CoveringCeiling"/> -->
  </CatalogTypeExtension>
  <CatalogTypeExtension type="Concrete Column">
    <InstanceDataDefinition defType="USER" definition="Pset_ColumnCommon"/>
    <!-- InstanceDataDefinition defType="USER" definition="Pset_ReinforcementBarPitchOfColumn"/> -->
  </CatalogTypeExtension>

```

# Bentley Architecture Placement Tools

- IFC2x3\_pset properties listed with Bentley Architecture properties



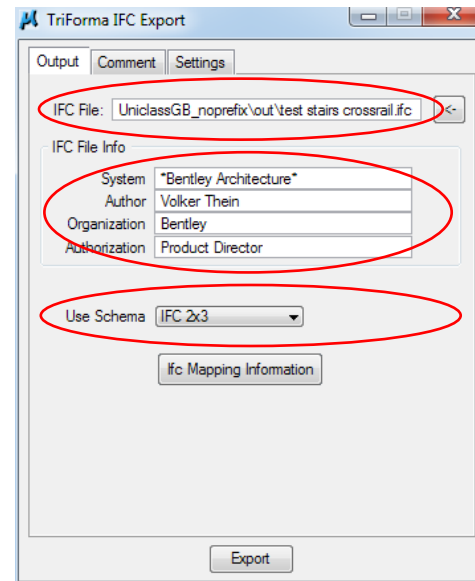


# Export IFC

## Settings and Options

# IFC Export – Output tab

- IFC File
  - default: 'setting' folder in dataset, or
  - folder specified in config. var. TFDIR\_IFC
- IFC File Info
  - System
  - Autor
  - Organization
  - Authorization
- Use Schema
  - IFC2x, IFC2x2, or IFC2x3
  - config. var. IFC\_VERSION



# IFC Configuration Variables

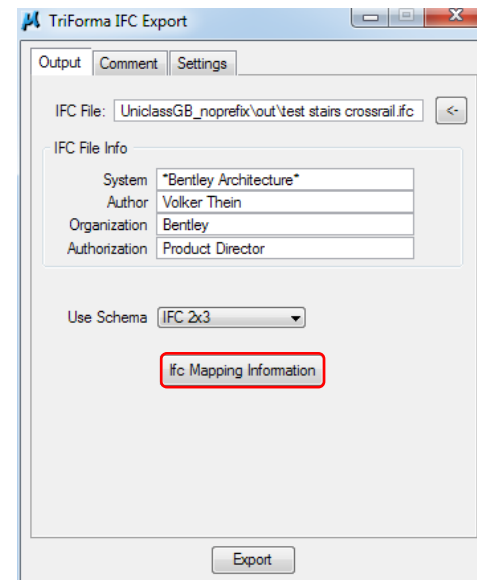
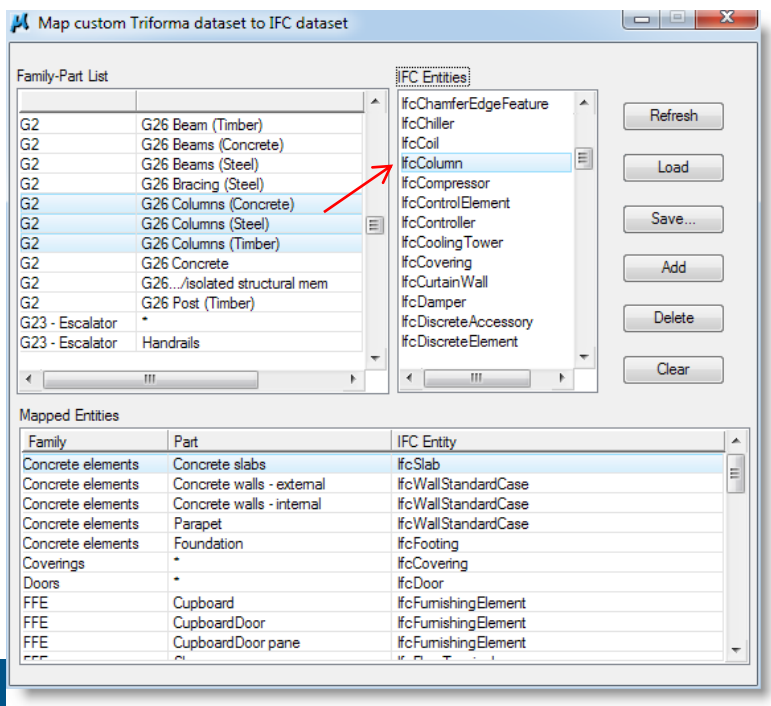
Configuration Variable	Value	Use
TFDIR_IFC	Dir	Specifies the default directory for IFC files for import and export Note: IFC module will not load if this configuration variable is not defined
IFC_PART_MAPPING	File	Specifies the file name and directory path that maps Parts to IfcEntities Default 'ifcmapping.set' in directory specified by TFDIR_SETTING
IFC_PROPERTY_OVERRIDES	Dir	Specifies the directory for ifcimportdgoverrides.set and ifcdgoverrides.set Default directory specified by TFDIR_SETTING
IFC_NO_PROXIES	0 or 1	If '0', elements not mapped to an IfcEntity will be exported as IfcBuildingElementProxy If '1' elements not mapped to an IfcEntity will not be exported Default '0'
IFC_VERSION	2x, 2x2, or 2x3	Specifies the default IFC schema for export Default '2x3'
TFIFC_UNIQUE_NAMES	0 or 1	If '0', duplicate asset and spatial object names will be exported without change If '1', duplicate asset and spatial object names will be made unique according to COBie2 requirement Default '0'
TFIFC_PREF_IMP_MaterialForPartfamilyList TFIFC_PREF_IMP_PartFamilySymbology TFIFC_PREF_IMP_IfcOverride TFIFC_PREF_IMP_IgnoreStorey	0,1 or any	If '0', setting on the 'Settings' tab of IFC Import is off If '1', setting on the 'Settings' tab of IFC Import is on If any other value (or not defined), setting on the 'Settings' tab is as set previously Default 'not defined'
IFC_CRASH_RECOVERY	0 or 1	If '0', IFC Export does not create a temporary file, so IFC export cannot resume If '1', a temporary IFC file with intermediate result is created; IFC Export can resume from the model where the IFC export failed and append further IFC export data to the file Default '0'

# IFC Configuration Variables

IFC_DONT_FIT_VIEWS	0 or 1	If '0', all views are fit after IFC import If '1' views are not fit after IFC import Default '0'
TFIFC_NO_DATAGROUP	0 or 1	If '0', DataGroup data is imported and exported as IfcPropertySets If '1', DataGroup data is not imported or exported Default '0'
TFIFC_PREFS	Dir	Specifies the directory for the tfifcprefs.rsc file. Default directory specified by TFDIR_PREFS; if not defined directory specified by _USTN_HOME_PREFS
IFC_DONT_USE_DGGUID	0 or 1	If '0', DataGroup GUIDs are used as IfcGUIDs for IfcPropertySets on export If '1', the IfcGUIDs are created 'on the fly' Default '0'
IFC_ZIP_EXTRACT_DIR	Dir	Specifies the extraction directory of zipped ifc-files on import If not defined, directory specified by MS_TMP is used
TFIFC_NOVERTICAL	0 or 1	If '0', IFC functionality can only be used with a Bentley Building application If '1', IFC functionality can be used without a Bentley Building applications Default '0'
IFC_DISABLE_TYPE_PSETS	0, 1 or 2	If '0', DataGroup catalog property values are exported as shared Type/Style properties If '1', DataGroup catalog property values are <u>not</u> exported as shared Type/Style properties If '2', DataGroup catalog property values are exported as shared Type properties, except for doors and window Styles. Note: LiningProperties and PanelProperties are always used Default: 0

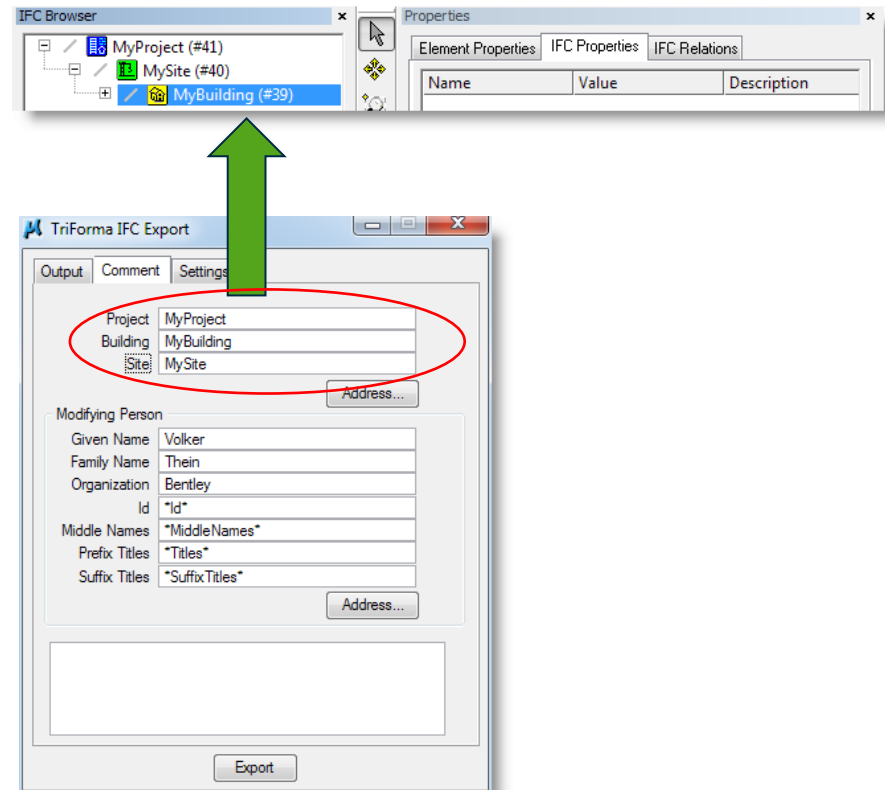
# IFC Export – Output tab

- IFC Mapping Information
  - Family/Part(s) mapped to corresponding Ifc Entity
  - also open via keyin 'ifcmap'
  - <path>\file name via config. var. IFC\_PART\_MAPPING



# IFC Export – Comment tab

- Project
- Building
- Site
- Modifying Person



# Project – Site Building

## Advanced Option

- create DataGroup types
- create Catalog items

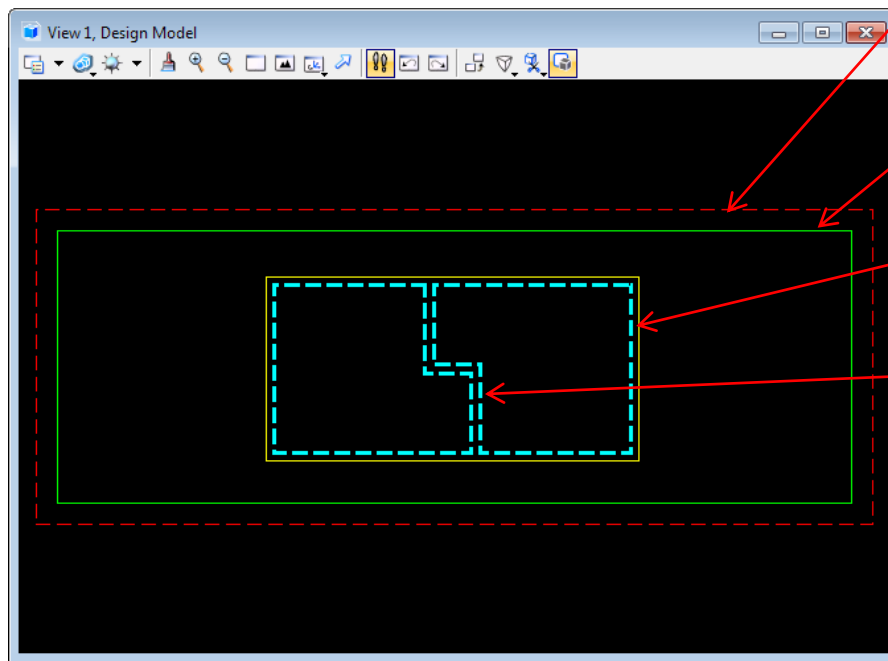
The screenshots illustrate the configuration of catalog items in the DataGroup Catalog Editor for NBHWeimar\_en. The interface shows a hierarchical tree view on the left and a table of definitions on the right.

Definition	Property	Value
FMH_Zone	Name	Flat 1
FMH_Zone	Description	Flat Number One
FMH_Zone	Reference	
pset_zonecommon	Reference	
pset_zonecommon	Category	
pset_zonecommon	Gross Area Planned	
pset_zonecommon	Net Area Planned	
pset_zonecommon	Publicly Accessible	<input type="checkbox"/>
pset_zonecommon	Handicap Accessible	<input type="checkbox"/>
IndustryClassification	ClassificationSystem	
IndustryClassification	ClassificationReference	
IndustryClassification	ClassificationName	
Pset_ZoneCommon	Reference	
Pset_ZoneCommon	Category	
Pset_ZoneCommon	Gross Area Planned	
Pset_ZoneCommon	Net Area Planned	
Pset_ZoneCommon	Publicly Accessible	<input type="checkbox"/>
Pset_ZoneCommon	Handicap Accessible	<input type="checkbox"/>

FMH_Building	Building/LongName	
FMH_Building	Building/BaseQuantities/Elevation	
FMH_Building	Building/BaseQuantities/Height	
IndustryClassification	ClassificationSystem	
IndustryClassification	ClassificationReference	
IndustryClassification	ClassificationName	
Pset_BuildingCommon	Main Fire Use	
Pset_BuildingCommon	Ancillary Fire Use	
Pset_BuildingCommon	Sprinkler Protection	<input type="checkbox"/>
Pset_BuildingCommon	Sprinkler Protection Automatic	<input type="checkbox"/>
Pset_BuildingCommon	Occupancy Type	
Pset_BuildingCommon	Gross Planned Area	
Pset_BuildingCommon	Building ID	
Pset_BuildingCommon	Is PermanentID	<input type="checkbox"/>
Pset_BuildingCommon	Number of Storeys	
Pset_BuildingCommon	Year of Construction	
Pset_BuildingCommon	Is Landmarked	

# Project – Site – Building - Zone

- place MicroStation shapes into top level model
- attach instance data



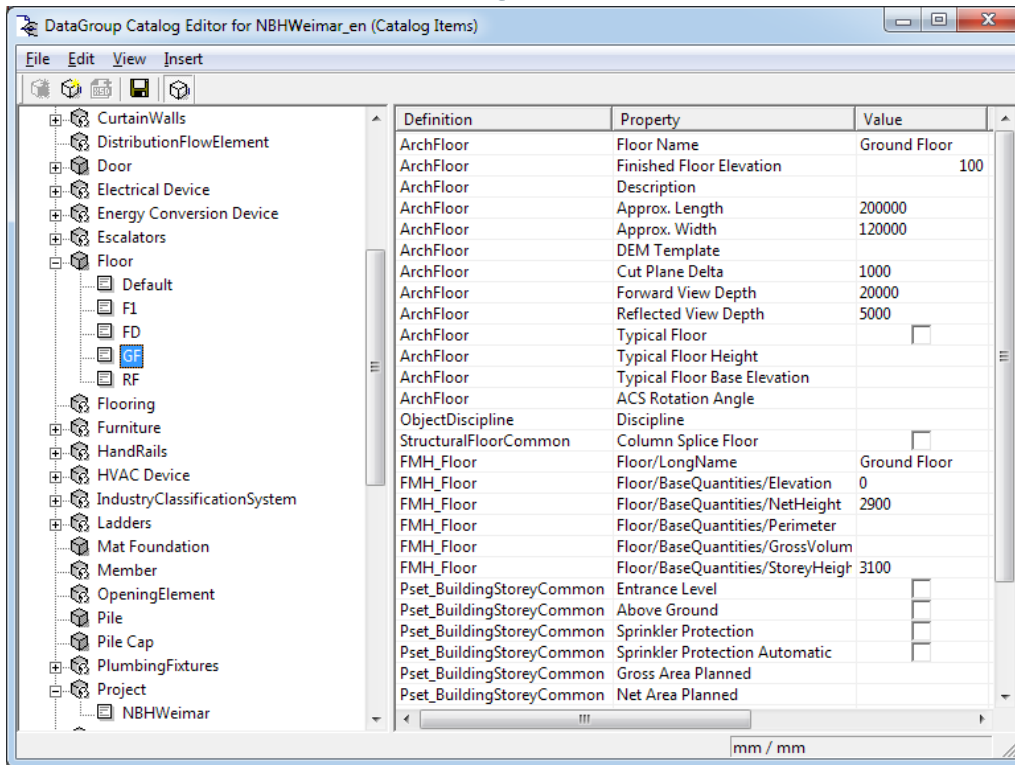
The image shows four overlapping 'DataGroup Instance Data' windows, each displaying a different level of the project hierarchy. Red arrows from the Design Model window point to these windows.

- FMH\_Project**: Shows the top-level project data.
- FMH\_Site**: Shows site-level data, including Site/Name (Baufeld J) and Site/LongName.
- ArchBuilding**: Shows building-level data, including Building Name (NBH-Haus-J.1) and ID.
- FMH\_Zone**: Shows zone-level data, including Name (Flat 2), Description (Flat Number Two), and various attributes like Gross Area Planned (0.000000) and IndustryClassification.



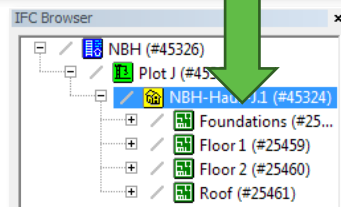
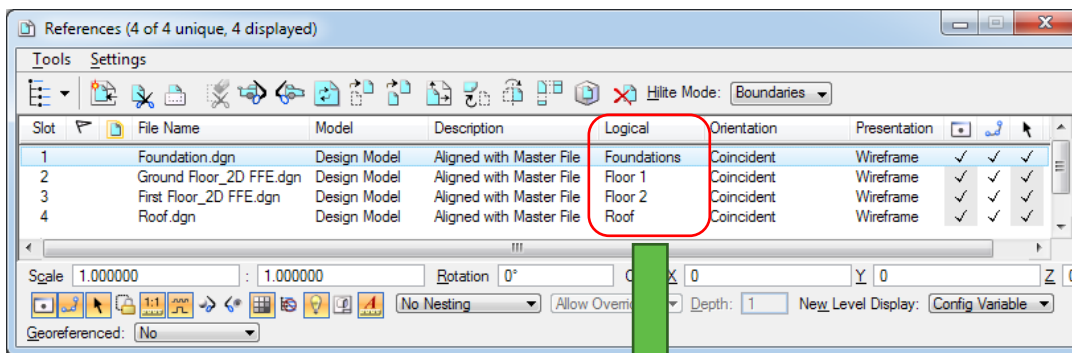
# Floors (Building Storeys)

- create a Catalog item for each floor



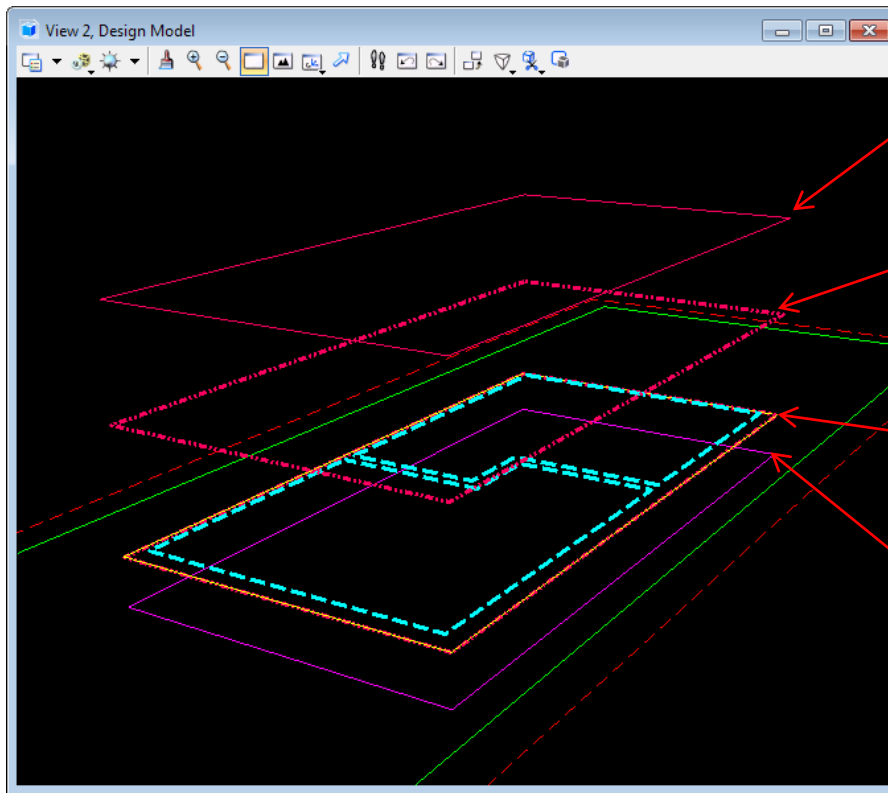
# Floors (Building Storeys)

- create one model per floor
- attach as reference(s)
- 'Logical' names are exported as 'IfcBuildingStorey'



# Floor (Building Storeys)

- place MicroStation shapes into referenced floor models
- attach Floor instance data



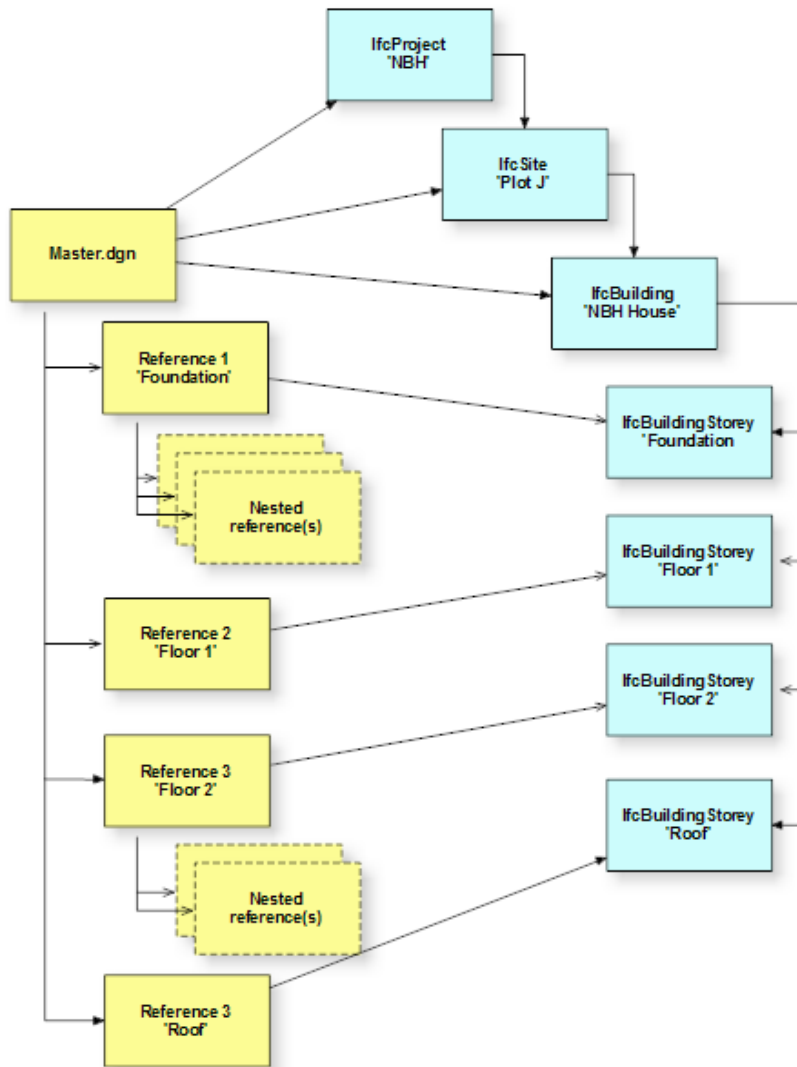
ArchFloor	
Floor Name	Roof
Finished Floor Elevation	6100
Description	

ArchFloor	
Floor Name	First Floor
Finished Floor Elevation	3200
Description	

ArchFloor	
Floor Name	Ground Floor
Finished Floor Elevation	100
Description	

ArchFloor	
Floor Name	Foundation
Finished Floor Elevation	-1250
Description	

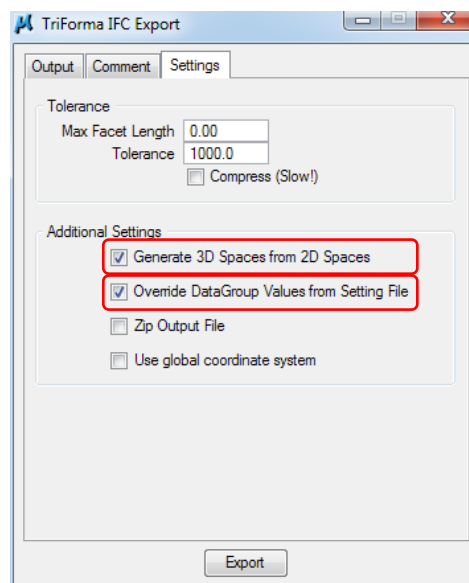
# Storey Containment



Name	Value
<b>ArchBuilding</b>	
Address 1	Albrecht-Duerer-Strasse 18
Address 2	
City	Weimar
State	
Country	Germany
Postal Code	99423
Year Constructed	
Gross Area	0.
Description 1	Neues Bauen am Horn - Site ...
Description 2	
Notes	
Web Address	
<b>Building</b>	
BuildingConstructi...	
BuildingUseClassifi...	
<b>uniclass_Building</b>	
GrossArea	0.
RawArea	0.
NetArea	0.
GrossVolume	0.
NetVolume	0.
SiteCoverage	0.
Remarks	
<b>BaseQuantities</b>	
GrossArea	156.64
NetArea	156.64
GrossAreaAllStories	626.56
Elevation	0.
Height	7.15
AbsoluteElevation	0.
GrossPerimeter	53.2

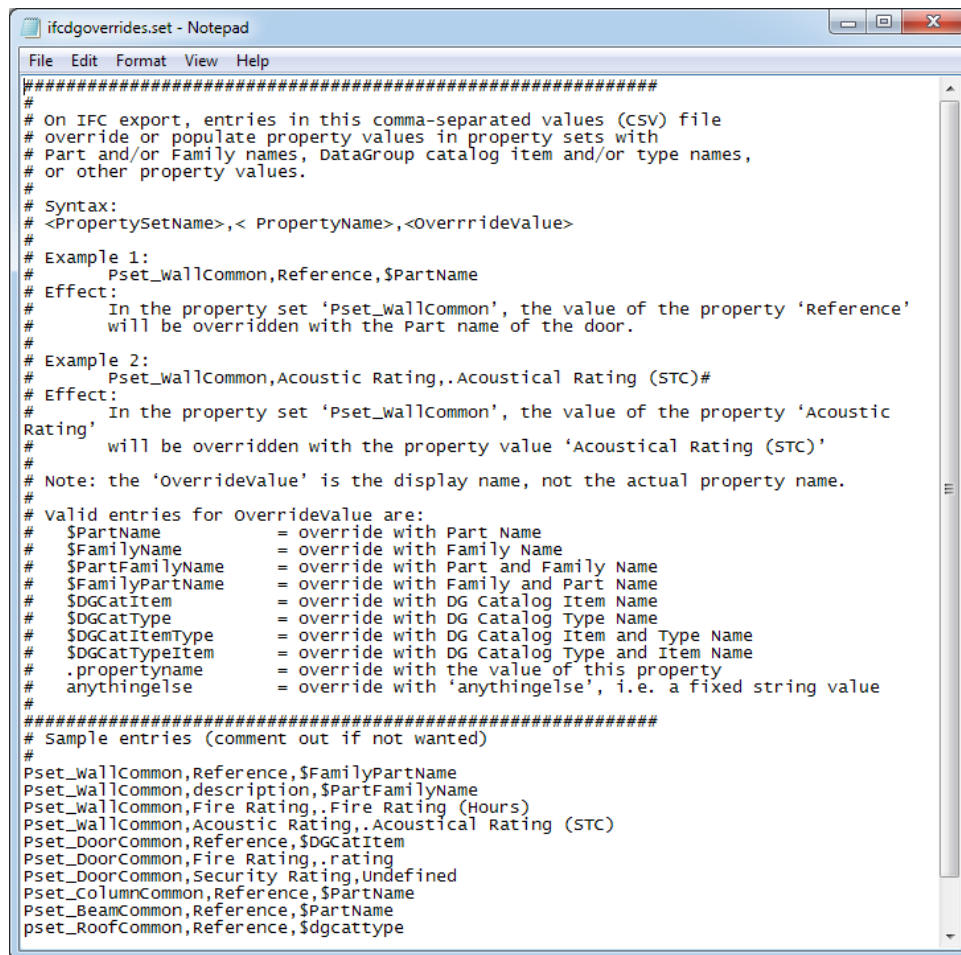
# IFC Export - Settings

- Generate 3D Spaces from 2D Spaces using 'Ceiling Height' property
- override DataGroup Values from Settings File (optional)



# IFC Export - Settings

- ifcdgoverrides.set
  - entries override or populate values in property sets with Part and/or Family names, DataGroup catalog item and/or type names



```
#####
#
# On IFC export, entries in this comma-separated values (CSV) file
# override or populate property values in property sets with
# Part and/or Family names, DataGroup catalog item and/or type names,
# or other property values.
#
# Syntax:
# <PropertySetName>,< PropertyName>,<OverrideValue>
#
# Example 1:
# Pset_wallCommon,Reference,$PartName
# Effect:
# In the property set 'Pset_wallCommon', the value of the property 'Reference'
# will be overridden with the Part name of the door.
#
# Example 2:
# Pset_wallCommon,Acoustic Rating,.Acoustical Rating (STC)#
# Effect:
# In the property set 'Pset_wallCommon', the value of the property 'Acoustic
# Rating'
# will be overridden with the property value 'Acoustical Rating (STC)'
#
# Note: the 'overridevalue' is the display name, not the actual property name.
#
# Valid entries for OverrideValue are:
# $PartName = override with Part Name
# $FamilyName = override with Family Name
# $PartFamilyName = override with Part and Family Name
# $FamilyPartName = override with Family and Part Name
# $DGCatItem = override with DG Catalog Item Name
# $DGCatType = override with DG Catalog Type Name
# $DGCatItemType = override with DG Catalog Item and Type Name
# $DGCatTypeItem = override with DG Catalog Type and Item Name
# .propertyname = override with the value of this property
# anythingelse = override with 'anythingelse', i.e. a fixed string value
#
#####
# Sample entries (comment out if not wanted)
#
Pset_wallCommon,Reference,$FamilyPartName
Pset_wallCommon,description,$PartFamilyName
Pset_wallCommon,Fire Rating,.Fire Rating (Hours)
Pset_wallCommon,Acoustic Rating,.Acoustical Rating (STC)
Pset_DoorCommon,Reference,$DGCatItem
Pset_DoorCommon,Fire Rating,.rating
Pset_DoorCommon,Security Rating,Undefined
Pset_ColumnCommon,Reference,$PartName
Pset_BeamCommon,Reference,$PartName
pset_RoofCommon,Reference,$DGCatType
```

# IFC Export - Settings

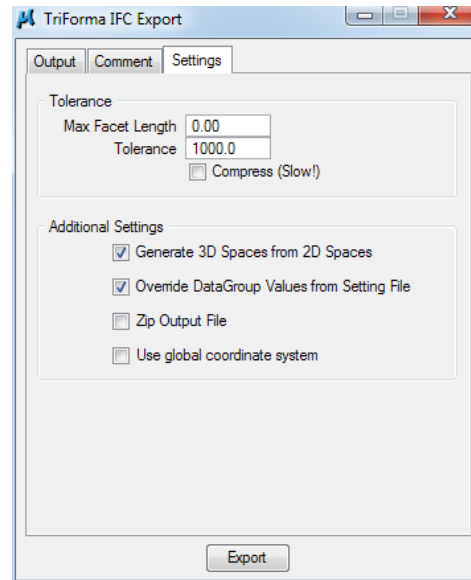
- e.g.
  - Pset\_WallCommon,Reference,\$PartName
  - Pset\_WallCommon,Description,\$PartFamilyName

The screenshot shows the Properties dialog box with the IFC Properties tab selected. It displays two pset objects with their respective properties and values. Red boxes and arrows highlight specific values: 'Part name' for Reference and Description, and 'Family name' for Description.

Name	Value
<input checked="" type="checkbox"/> pset_wallcommon	
Reference	BIMSample Exterior Metal Stud
AcousticRating	
FireRating	1 HR
Combustible	FALSE
SurfaceSpreadOfFlame	
ThermalTransmittance	0.
IsExternal	TRUE
ExternalWall	TRUE
ExtendToStructure	FALSE
LoadBearing	FALSE
Compartmentation	FALSE
Description	BIMSample Exterior Metal Stud : C1010_BIMSample
Reference	BIMSample Brick
AcousticRating	
FireRating	2 HR
Combustible	FALSE
SurfaceSpreadOfFlame	
ThermalTransmittance	2.28
IsExternal	TRUE
ExternalWall	TRUE
ExtendToStructure	FALSE
LoadBearing	TRUE
Compartmentation	FALSE

# IFC Export

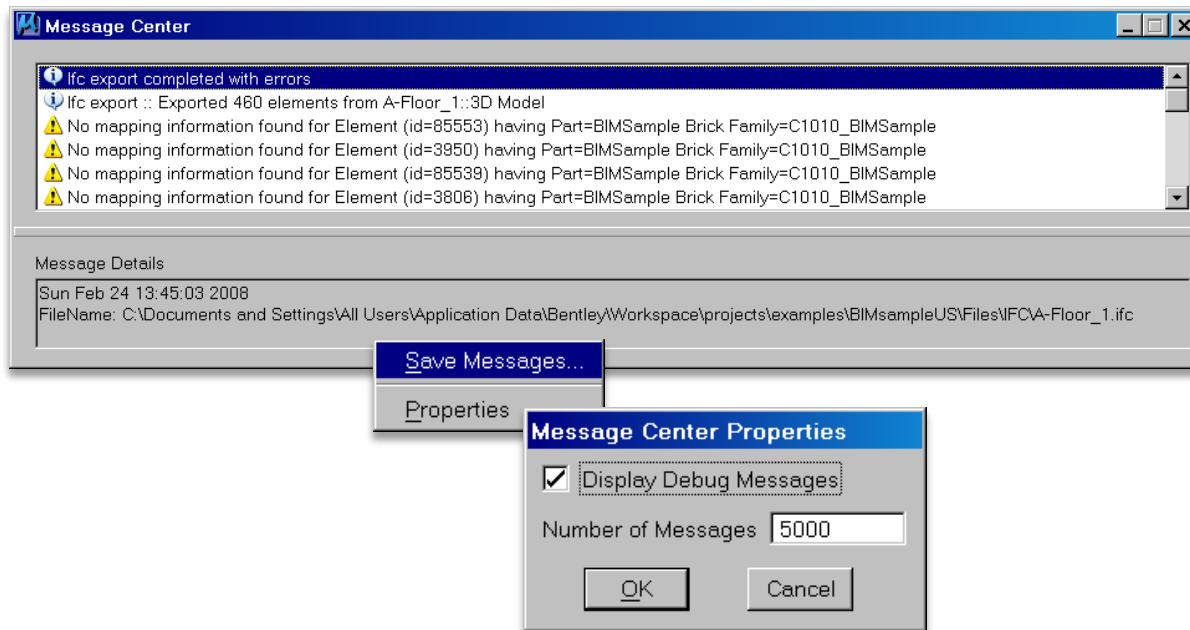
- click Export to start IFC export





# IFC Export – Error Log

- IFC export completion



IFC Browser

- NBH (#45326)
  - Plot J (#45325)
    - NBH-Haus-J1 (#45324)
      - Foundations (#25458)
      - Floor 1 (#25459)
      - Floor 2 (#25460)
      - Roof (#25461)
  - IfcZone [2]
    - Flat 2 (#25456)
    - Flat 1 (#25457)

Properties


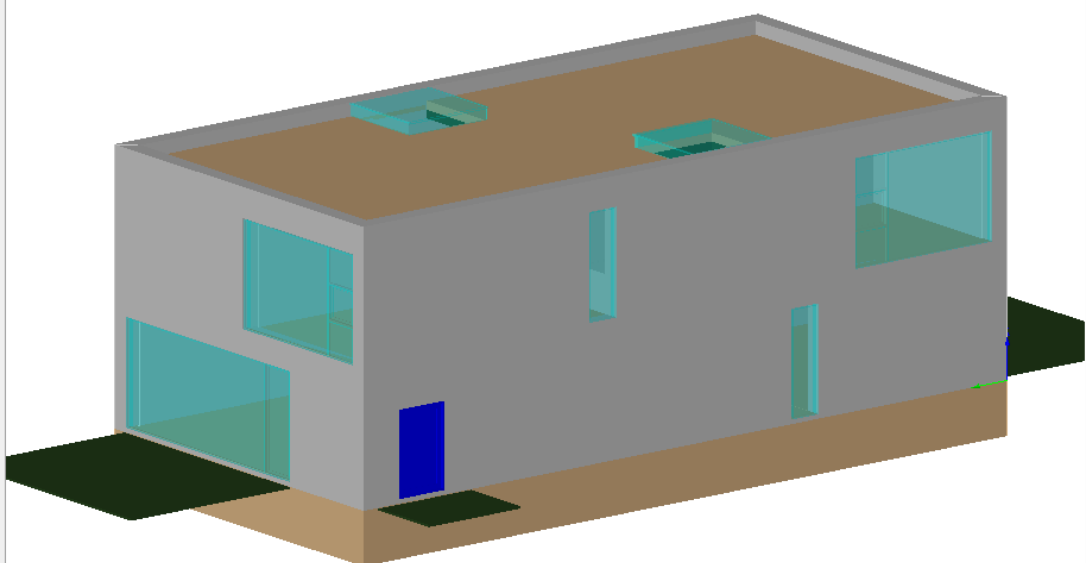
Name	Value
<b>ArchBuilding</b>	
Address 1	Albrecht-Duerer-Strasse 18
Address 2	
City	Weimar
State	
Country	Germany
Postal Code	99423
Year Constructed	
Gross Area	0.
Description 1	Neues Bauen am Horn - S...
Description 2	
Notes	
Web Address	
<b>Building</b>	
BuildingConstruction...	
BuildingUseClassificat...	
<b>uniclass_Building</b>	
GrossArea	0.
RawArea	0.
NetArea	0.
GrossVolume	0.
NetVolume	0.
SiteCoverage	0.
Remarks	
<b>BaseQuantities</b>	
GrossArea	156.64
NetArea	156.64
GrossAreaAllStories	626.56
Elevation	0.
Height	7.15
AbsoluteElevation	0.
GrossPerimeter	53.2

IFC Element

Elements Layers

- IfcProject
- IfcSite
- IfcBuilding
- IfcBuildingStorey
- IfcSpace
- IfcWall
- IfcWallStandardCase
- IfcOpeningElement
- IfcSlab\_Floor
- IfcDoor
- IfcWindow
- IfcStair
- IfcZone
- IfcCovering
- IfcFurnishingElement
- IfcBuildingElementPart
- IfcFooting
- IfcEnergyConversionDevice
- IfcFlowTerminal

OpenGL IFCViewer

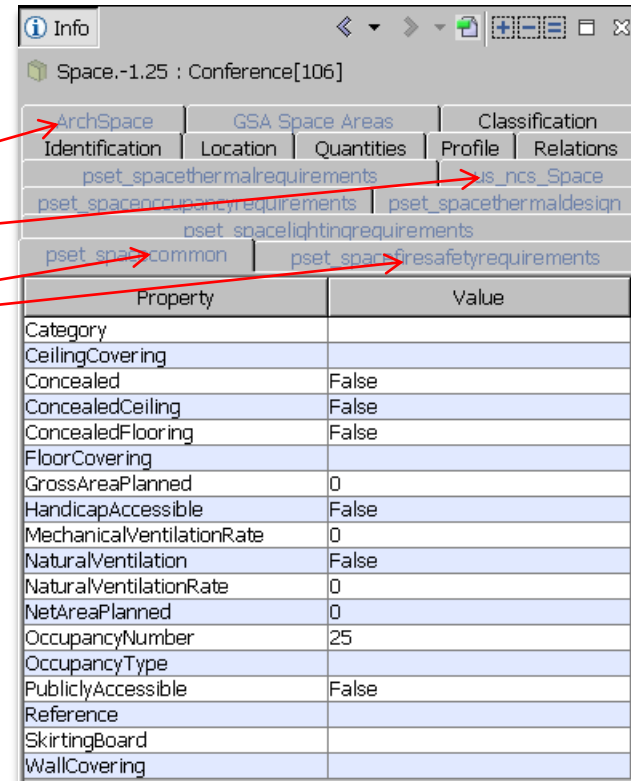
# IFC Viewers

- IFC file imported into IfcStoreyView (Karlsruhe Institute of Technology)
  - BA properties
  - IFC2x3 psets

Name	Value
<b>PropertySets from entity</b>	
<b>ArchSpace</b>	
Label	Atrium
Number	107
Label 2	
Ceiling Height	6.096
Perimeter	13.735035
Program Area	1500.
Actual Area	100.
SchemaVersion/major	1.
SchemaVersion/minor	1.
pset_spacecommon	
Reference	
OccupancyType	
OccupancyNumber	0
PubliclyAccessible	FALSE
HandicapAccessible	FALSE
NaturalVentilation	FALSE
NaturalVentilationRate	0.
MechanicalVentilationRate	0.
Concealed	FALSE
Category	
FloorCovering	
WallCovering	
CeilingCovering	
SkirtingBoard	
GrossAreaPlanned	0.
NetAreaPlanned	0.
ConcealedFlooring	FALSE
ConcealedCeiling	FALSE
pset_spacesafetyrequirements	
MainFireUse	
AncillaryFireUse	
FireRiskFactor	
FireHazardFactor	
FlammableStorage	FALSE
FireExit	FALSE
SprinklerProtection	FALSE

# IFC Viewers

- IFC file imported into Solibri Model Viewer (Solibri, Inc.)
  - BA properties
  - IFC2x3 psets



Info  
Space.-1.25 : Conference[106]

ArchSpace	GSA Space Areas	Classification		
Identification	Location	Quantities	Profile	Relations
pset_spacethermalrequirements		is_ncs_Space		
pset_spaceoccupancyrequirements		pset_spacethermaldesign		
		pset_spacelightingrequirements		
pset_spacommon		pset_spafiresafetyrequirements		

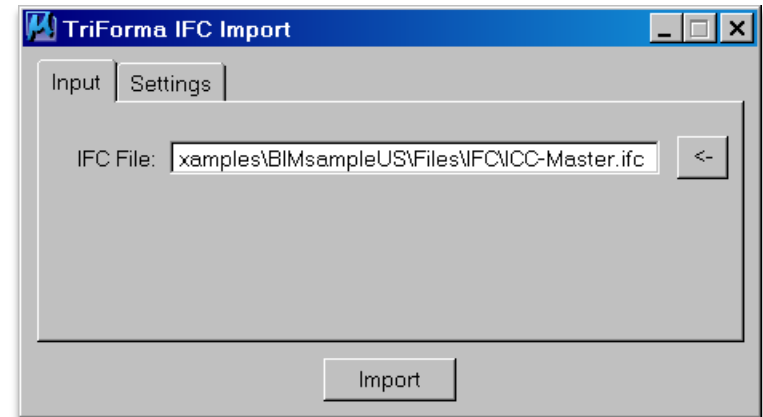
Property	Value
Category	
CeilingCovering	
Concealed	False
ConcealedCeiling	False
ConcealedFlooring	False
FloorCovering	
GrossAreaPlanned	0
HandicapAccessible	False
MechanicalVentilationRate	0
NaturalVentilation	False
NaturalVentilationRate	0
NetAreaPlanned	0
OccupancyNumber	25
OccupancyType	
PubliclyAccessible	False
Reference	
SkirtingBoard	
WallCovering	

# Import IFC

## Settings and Options

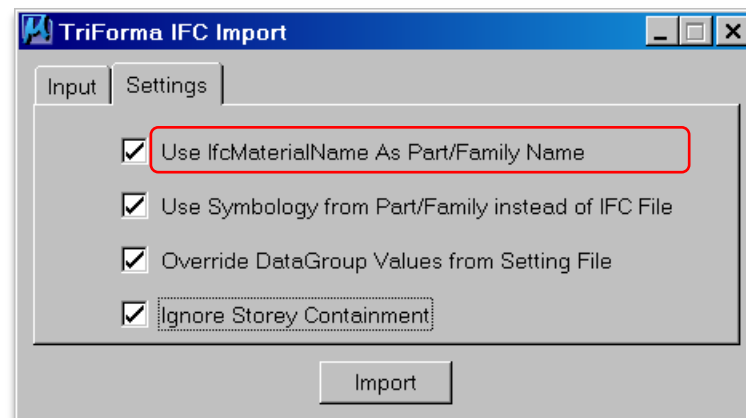
# IFC Import - Input

- select IFC file
- default folder defined by config. var. TFDIR\_IFC in PCF-file  
e.g. TFDIR\_IFC = \$(\_USTN\_PROJECTDATA)out/



# IFC Import - Settings

- ‘Use IfcMaterialName As Part/Family Name’ determines information applied as Part to imported elements:
  - if checked, values of ‘Material’ property in ifc-file are applied as ‘Part’ name to imported elements
  - if unchecked, Parts corresponding to the IfcEntity in the ‘IFC’ family of the Bentley Architecture dataset are applied to imported elements



... then Family 'IfcWall' and Part 'P30N32' applied to corresponding Bentley Architecture walls

Identification	Part
Quantities	Family: IfcWall
Attributes	Part: P30N32
Features	

e.g., if Material value for IfcWalls is 'P30N32' in the ifc-import file ...

<b>Material</b>	
Material (LayerSet)	Wall: Insitu P30N32 200.000
Material Layers	
1. Layer	
Width	200.000000
Material	<b>P30N32</b>
IsVentilated	False

checked?

'Use IfcMaterialName As Part/Family Name'

yes

no

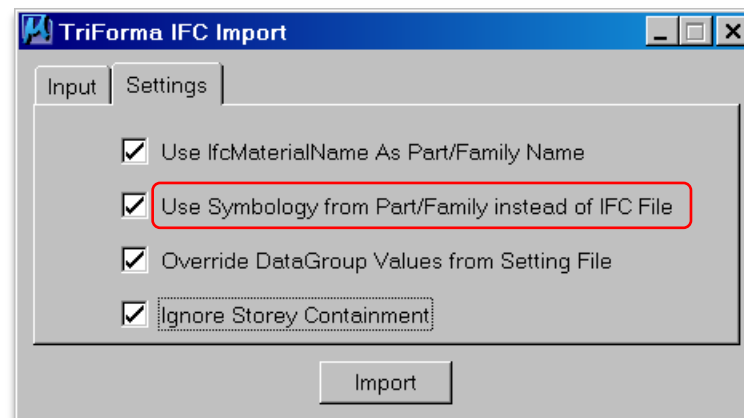
Identification	Part
Quantities	Family: IFC Industry Foundation Classes
Attributes	Part: IfcWall
Features	

... then Family 'IFC' and Part 'IfcWall' applied to all walls, regardless of 'Material' property in ifc-i file



# IFC Import - Settings

- ‘Use Symbology from Part/Family instead of IFC File’ determines symbology to be applied to imported elements
  - if checked, symbology specified for Part corresponding to IfcEntity in ‘IFC’ Family of Bentley Architecture dataset is used
  - if unchecked, symbology in ifc-import file is used for imported elements



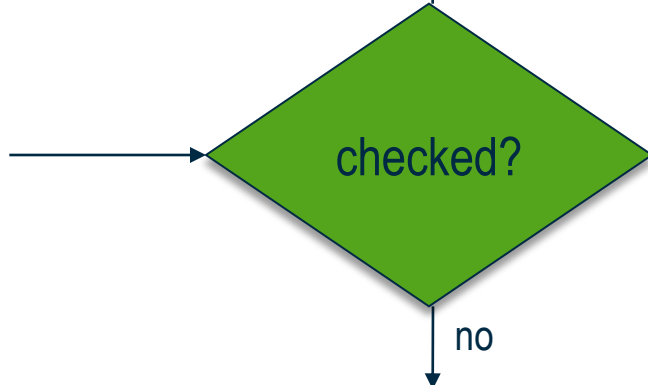
... symbology specified for Part 'IfcWall' in Family 'IFC' is used

Part definition in Family 'IFC'

Identification	Symbology	Behavior
Quantities	Level: <input type="text" value="Level 1"/>	Graphic Group: <input type="text" value="0"/>
Attributes	Color: <input type="text" value="6"/>	Display: <input type="text" value="Faces"/>
Features	Style: <input type="text" value="0"/>	Assoc. Behavior: <input type="text" value="Active"/>
Drawing Notation		

Part	Description	Level	Color	Style	Weight
IfcWall		Level 1	6	0	0
IfcWallStandardCase		Level 1	6	0	0
IfcWindow		Level 1	5	0	0

e.g., if imported element is a wall ...



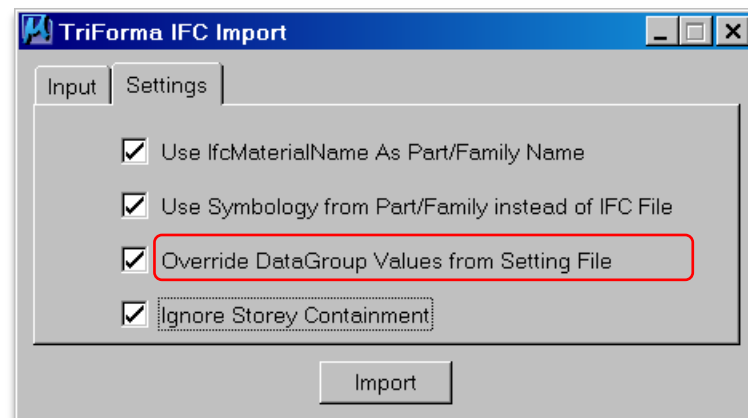
'Use Symbology from Part/Family instead of IFC File'

Identification	Symbology	Behavior
Quantities	Level: <input type="text" value="Default"/>	Graphic Group: <input type="text" value="0"/>
Attributes	Color: <input type="text" value="0"/>	Display: <input type="text" value="Faces"/>
Features	Style: <input type="text" value="0"/>	Assoc. Behavior: <input type="text" value="Active"/>
Drawing Notation	Weight: <input type="text" value="0"/>	Form Perforation: <input type="text" value=""/>

... symbology specified in IFC-file is used

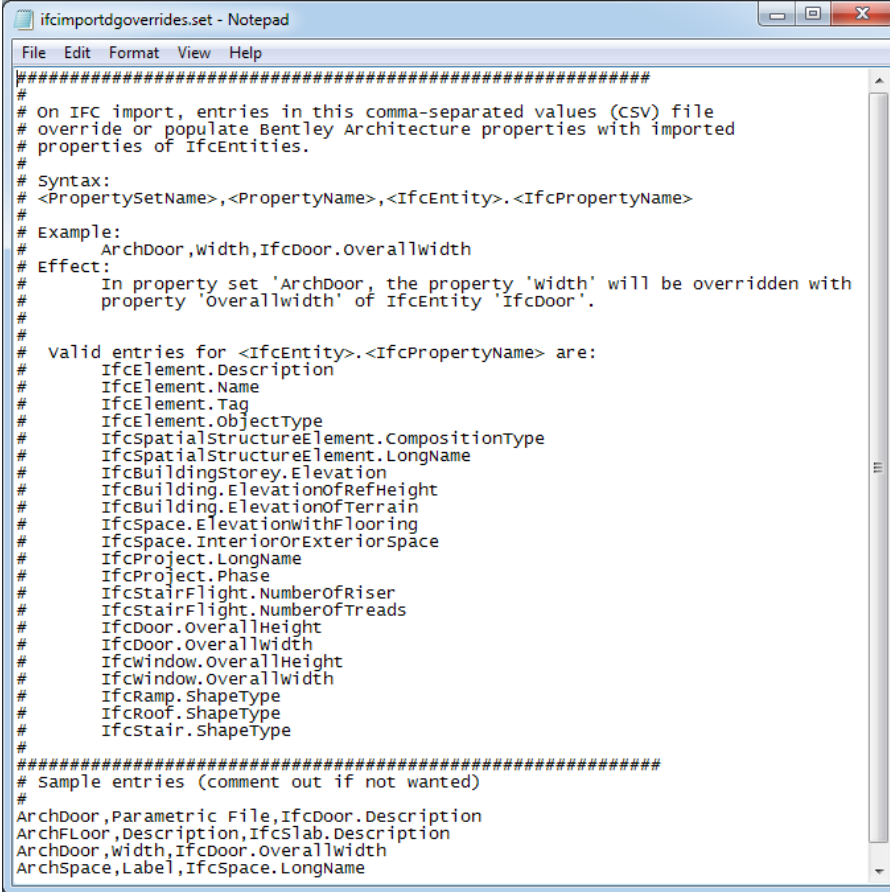
# IFC Import - Settings

- 'Override DataGroup Values from Setting File'
  - If checked, BA properties are overridden or populated with imported properties of Ifc Entities
  - via mapping in file 'ifcimportdgooverrides.set'



# IFC Import - Settings

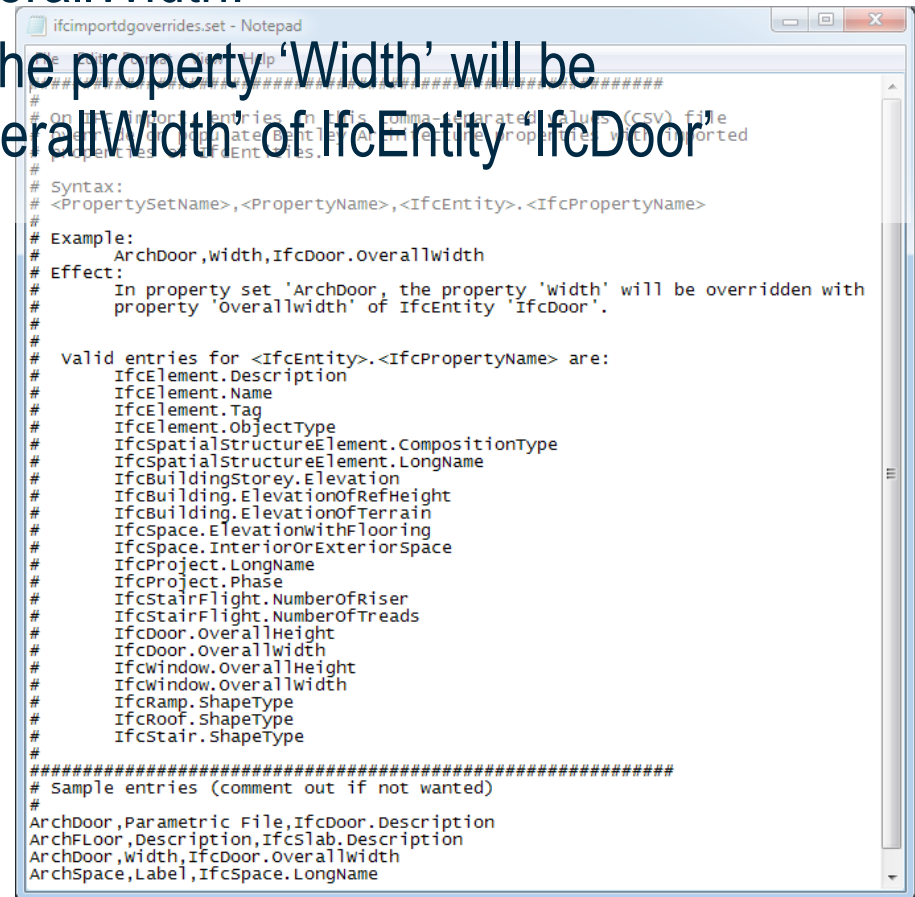
- ifcimportdgooverrides.set



```
ifcimportdgooverrides.set - Notepad
File Edit Format View Help
#####
#
# On IFC import, entries in this comma-separated values (CSV) file
# override or populate Bentley Architecture properties with imported
# properties of IfcEntities.
#
# Syntax:
# <PropertySetName>,<PropertyName>,<IfcEntity>.<IfcPropertyName>
#
# Example:
# ArchDoor,width,IfcDoor.Overallwidth
# Effect:
# In property set 'ArchDoor', the property 'width' will be overridden with
# property 'Overallwidth' of IfcEntity 'IfcDoor'.
#
# Valid entries for <IfcEntity>.<IfcPropertyName> are:
# IfcElement.Description
# IfcElement.Name
# IfcElement.Tag
# IfcElement.ObjectType
# IfcSpatialStructureElement.CompositionType
# IfcSpatialStructureElement.LongName
# IfcBuildingStorey.Elevation
# IfcBuilding.ElevationOfRefHeight
# IfcBuilding.ElevationOfTerrain
# IfcSpace.ElevationWithFlooring
# IfcSpace.InteriorOrExteriorSpace
# IfcProject.LongName
# IfcProject.Phase
# IfcStairFlight.NumberOfRiser
# IfcStairFlight.NumberOfTreads
# IfcDoor.OverallHeight
# IfcDoor.Overallwidth
# IfcWindow.OverallHeight
# IfcWindow.Overallwidth
# IfcRamp.ShapeType
# IfcRoof.ShapeType
# IfcStair.ShapeType
#####
# Sample entries (comment out if not wanted)
#
ArchDoor,Parametric File,IfcDoor.Description
ArchFloor,Description,IfcSlab.Description
ArchDoor,width,IfcDoor.Overallwidth
ArchSpace,Label,IfcSpace.LongName
```

# IFC Import - Settings

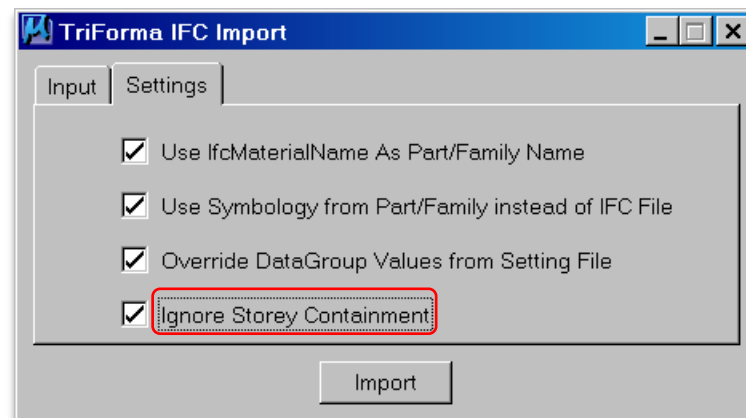
- e.g.
  - ArchDoor,width,IfcDoor.OverallWidth:
  - in property set 'ArchDoor, the property 'Width' will be overridden with property 'OverallWidth' of IfcEntity 'IfcDoor'



```
ifcimportdgooverrides.set - Notepad
#####
# on the following entries in this comma-separated file (csv) file
# you can override Bentley AIA IFC properties with imported
# properties of IFC Entities.
#
# Syntax:
# <PropertySetName>,<PropertyName>,<IfcEntity>.<IfcPropertyName>
#
# Example:
# ArchDoor,width,IfcDoor.overallwidth
# Effect:
# In property set 'ArchDoor, the property 'width' will be overridden with
# property 'overallwidth' of IfcEntity 'IfcDoor'.
#
#
# valid entries for <IfcEntity>.<IfcPropertyName> are:
# IfcElement.Description
# IfcElement.Name
# IfcElement.Tag
# IfcElement.ObjectType
# IfcSpatialStructureElement.CompositionType
# IfcSpatialStructureElement.LongName
# IfcBuildingStorey.Elevation
# IfcBuilding.ElevationOfRefHeight
# IfcBuilding.ElevationOfTerrain
# IfcSpace.ElevationwithFlooring
# IfcSpace.InteriororExteriorSpace
# IfcProject.LongName
# IfcProject.Phase
# IfcStairFlight.NumberOfRiser
# IfcStairFlight.NumberOfTreads
# IfcDoor.OverallHeight
# IfcDoor.Overallwidth
# IfcWindow.OverallHeight
# IfcWindow.Overallwidth
# IfcRamp.ShapeType
# IfcRoof.ShapeType
# IfcStair.ShapeType
#
#####
# Sample entries (comment out if not wanted)
#
ArchDoor,Parametric File,IfcDoor.Description
ArchFloor,Description,IfcSlab.Description
ArchDoor,width,IfcDoor.Overallwidth
ArchSpace,Label,IfcSpace.LongName
```

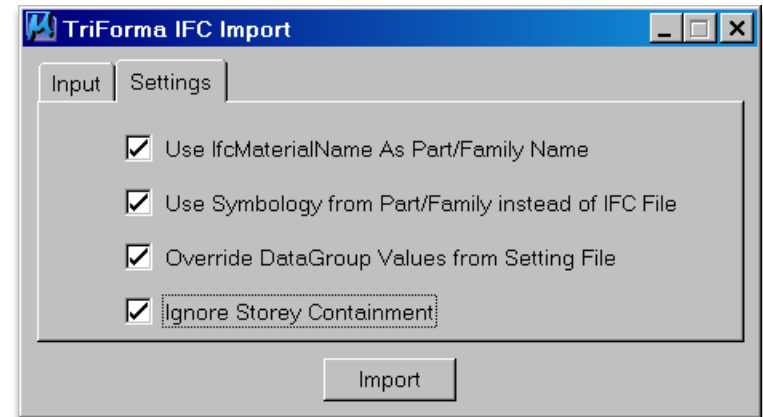
# IFC Import - Settings

- ‘Ignore Storey Containment’
  - if checked, all data imported into active DGN model, i.e. ignoring Storey Containment info in IFC import file
  - if unchecked,
    - each IfcBuildingStorey in IFC import file written to separate DGN model
    - all DGN models referenced to active DGN model



# IFC Import

- Click 'Import' to start IFC import



# Open IFC

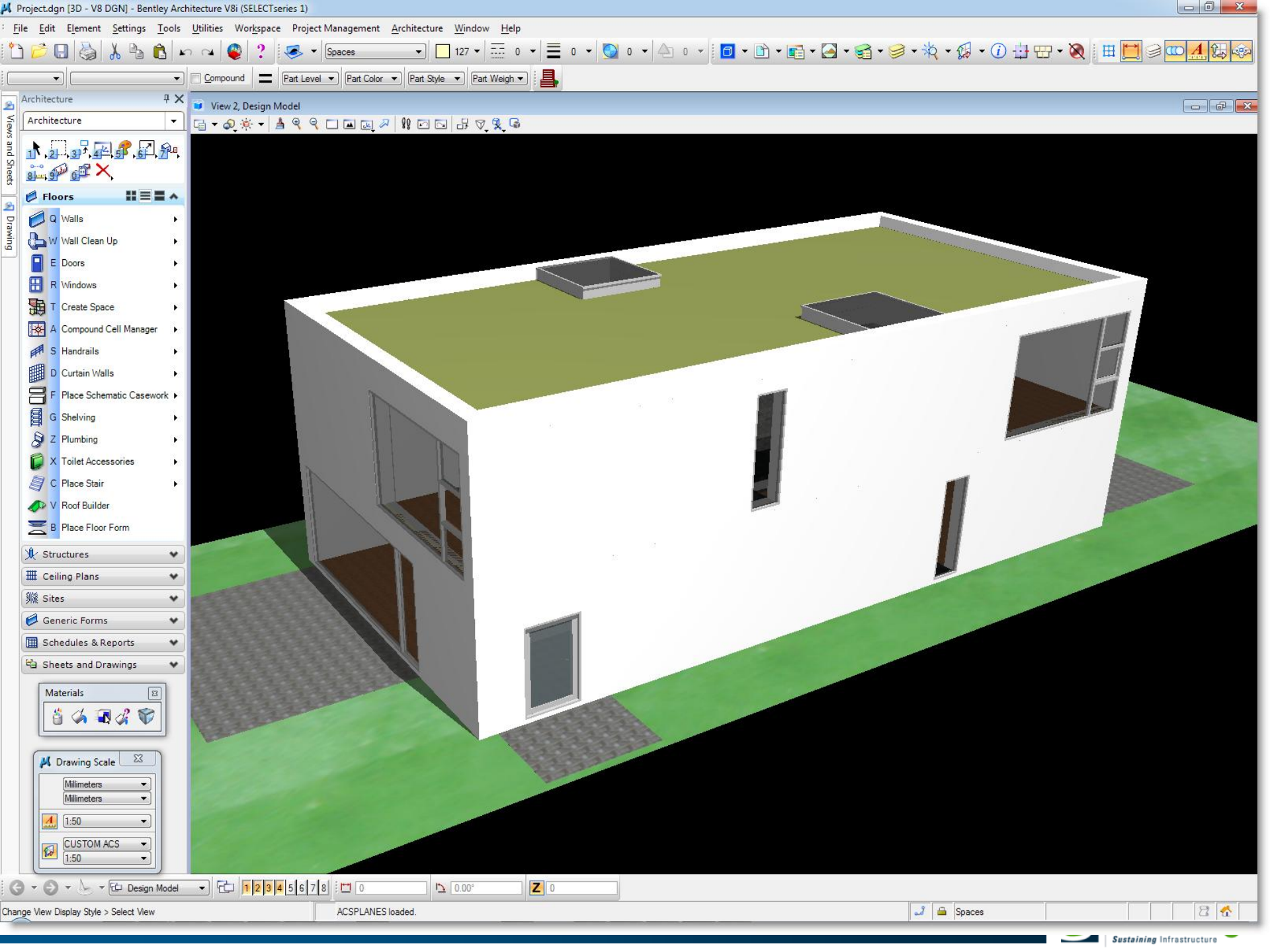


# IFC support in ProjectWise i-model Composer, ProjectWise Navigator and MicroStation

- TriForma-based IFC import
  - **interprets** IFC definitions
  - tries to **translate IFC definitions** to Bentley Architecture definitions (which may not always be possible)

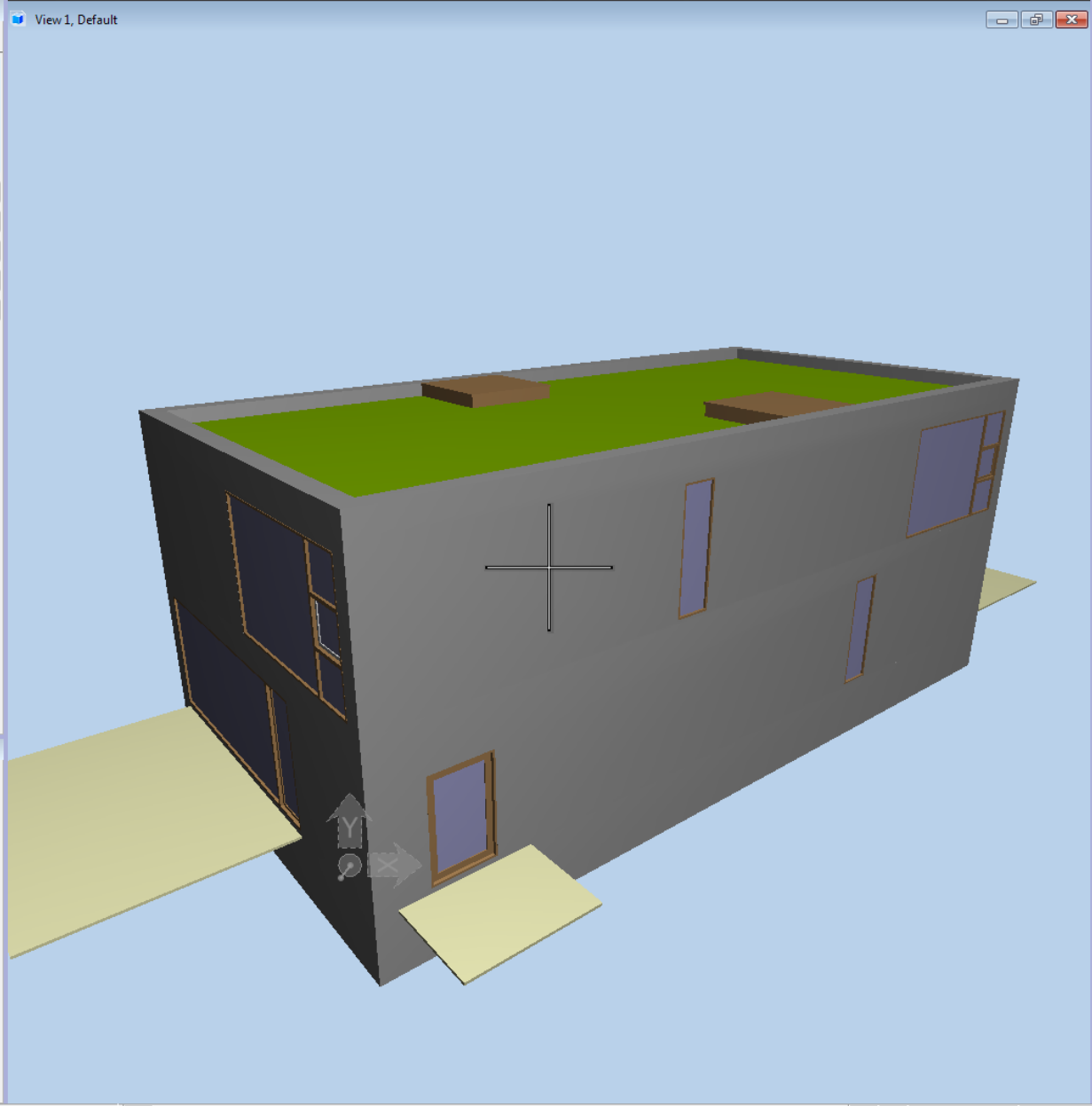
# IFC support in ProjectWise i-model Composer, ProjectWise Navigator and MicroStation

- ProjectWise i-model Composer (~Dec '10)
  - creates **loss-less i-models** from IFC files
  - includes **all property data**
  - read-only!
- ProjectWise Navigator (~Dec '10)
  - **opens IFC files** for viewing, navigation, clash detection, querying, reporting, ...
- MicroStation Ss3 (~2Q11)
  - **opens/references IFC** files for viewing, querying, reporting, coordination, ...



Tasks

- Review
  - Examine
    - Measure Distance
    - Section View
    - Create Markup
  - Draw
  - Visualize
  - Animate
  - Clash Detection
  - Schedule Simulation



Items

- Active
  - IfcBuildingElementPart
  - IfcBuildingStorey
  - IfcCovering
  - IfcDoor
    - Doors-Door
      - IfcLocalPlacement
      - IfcOwnerHistory
      - IfcProductDefinitionShape
      - Relates
      - Relates
      - Relates
      - Relates
      - Relates
      - Relates
      - Relates
      - Relates
      - IfcOwnerHistory
        - pset\_doorcommon
          - AcousticRating
          - FireExit
          - FireRating
          - IfcText (highlighted)
          - GlazingAreaFraction
          - HandicapAccessible
          - IfcOwnerHistory
          - Infiltration
          - IsExternal
          - Reference
          - SecurityRating
          - SelfClosing
          - SmokeStop
          - ThermalTransmittance
        - Relates
        - Relates
      - Doors-Door
      - Doors-Door
      - Doors-Door
      - Doors-Door
      - Doors-Door
      - Doors-Door
      - Doors-Door
      - Doors-Door
      - Doors-Door

Rotate View

Method: Dynamic

Details

IfcText

Value
F30

Save Undo

# Limitations of IFC

- high-end functionality reduced to level that most applications can support
- proprietary data types not exportable  
IFC only concerned with result, not how produced
- parameters, rules, and constraints of complex entities not supported  
e.g. doors, windows, curtain walls, stairs, railings, ...
- therefore, **no 'round tripping'!!!**

# Benefits of IFC

- vendor-neutral BIM data model
  - no 1-to-1 translators required
  - the ‘lingua franca’ for proprietary BIM formats
  - DXF for CAD, IFC for BIM
- improve Integrated Project Delivery using BIM methods
- streamline project workflows and facility lifecycle support
  - better coordination, collaboration, and interoperability of project delivery partners
  - handover of data from design to downstream tasks (cost estimation, analyses, facilities management, ...)
- integrate Building Information Modeling

# IFC2x3\_pset Dataset Extension

## Quick Reference Guide

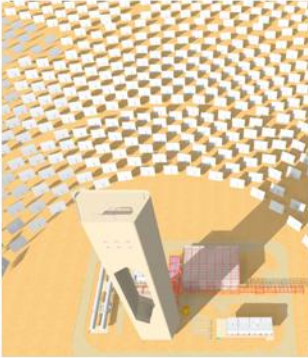
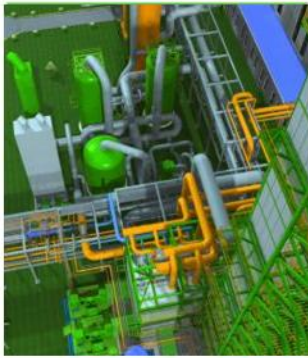
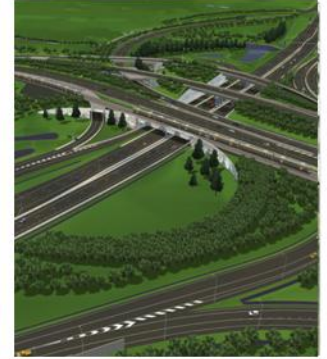
revision: Apr 15, 2008 - 19:53

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page 1 of 26

**further info:**

**IFC2x3\_pset Dataset Extension - Quick Reference Guide**  
or email: [volker.thein@bentley.com](mailto:volker.thein@bentley.com)



# Tack så mycket