



a presentation by Evolve Consultancy
and Bond Bryan Architects

IFC

DANIEL HESELWOOD

**THE GOOD
AND THE BAD
AND THE UGLY**

NIGEL DAVIES
ROB JACKSON

THE GOOD THE BAD AND THE UGLY

Starring

ROB JACKSON ARCHICAD

NIGEL DAVIES AECOSIM BUILDING DESIGNER

DANIEL HESELWOOD REVIT

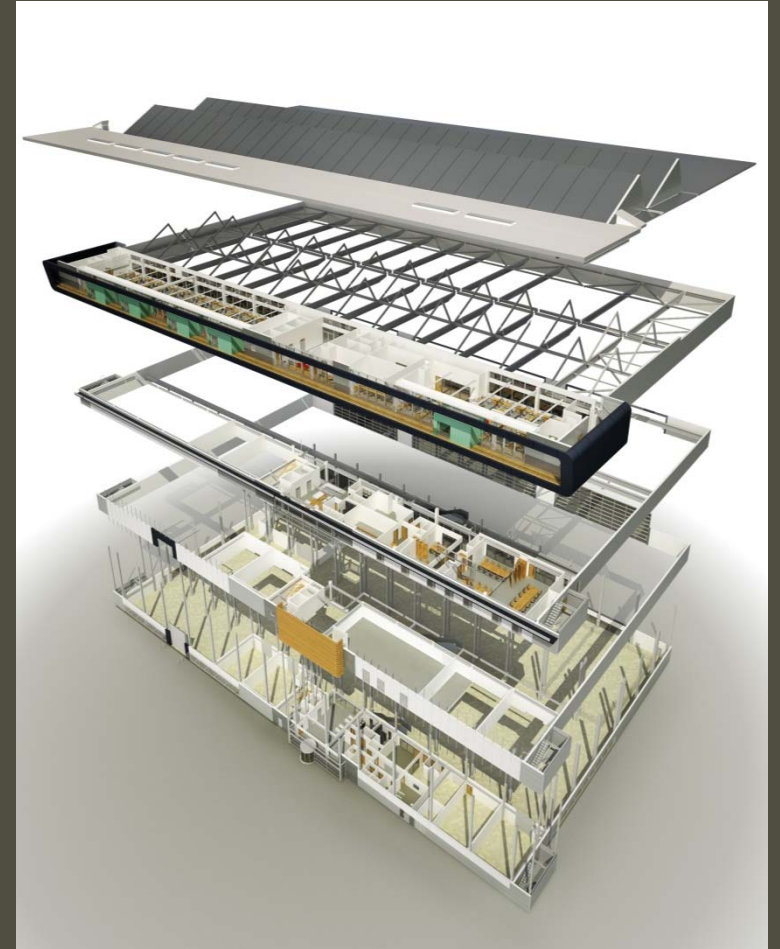
With Special Guest

IFC AS ITSELF



PRESENTATION CONTENT

- Introduction
- Preparation and planning
- Graphisoft ArchiCAD
- Bentley AECOsim
- Autodesk Revit
- Conclusion
- Questions



LEARNING OBJECTIVES

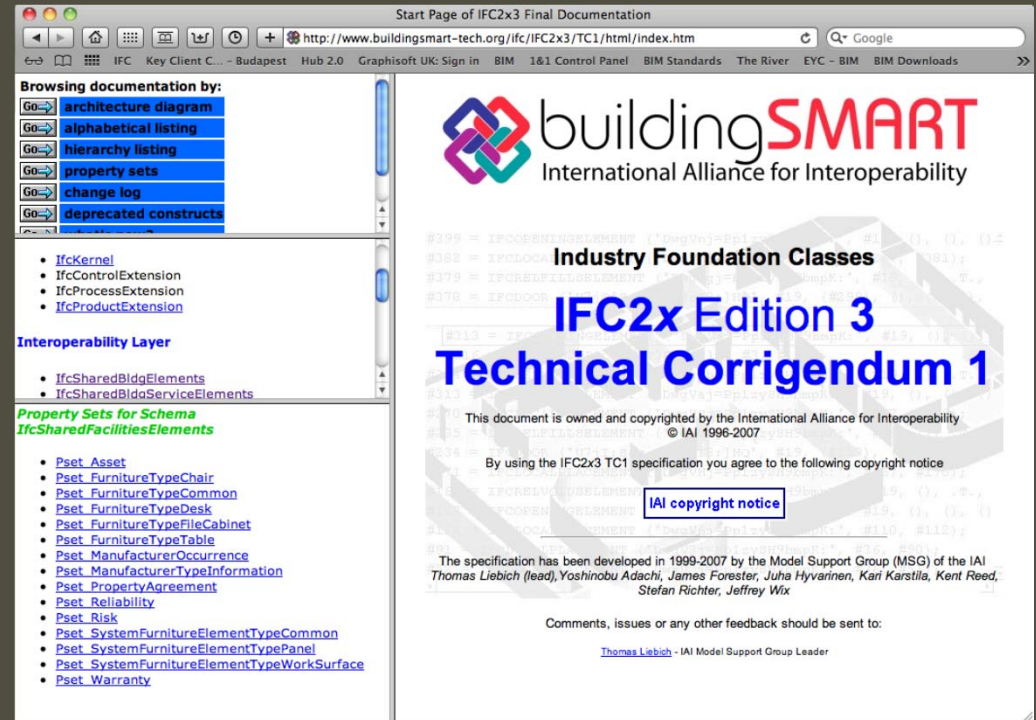
- Identify and list key areas for success and failure both in terms of graphics and metadata exchange
- Demonstrate IFC best-practice workflows and solutions to known issues
- Describe the actual technicalities of BIM exchange between major BIM software
- Set options for optimal IFC export and import



IFC AND OPEN BIM

- IFC stands for Industry Foundation Class
- IFC is an international standard - ISO16739
- Current release is IFC4 (March 2013)
- Current version in day-to-day use is **IFC2x3**
- IFC is authored / maintained by buildingSMART
- Formerly known as the International Alliance for Interoperability (IAI)
- buildingSMART UK is run by the Building Research Establishment (BRE)
- Aim is to improve the exchange of information between software applications used in the construction industry

www.buildingsmart-tech.org




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IFC AND OPEN BIM

www.buildingsmart-tech.org/certification/ifc-certification-2.0/ifc2x3-cv-v2.0-certification/participants



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Implementation Support Group

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You are here: Home / Certification / IFC Certification 2.0 / IFC2x3 CV V2.0 Certification / Participants

Participants

Filed under: [Certification](#)

Software Developer	Software Application	Exchange Requirement	Export/Import	Status
Archimen	Active3D	- (*)	Import	in progress
Autodesk	AutoCAD Architecture	Architecture	Import & Export	in progress
Autodesk	AutoCAD MEP	BuildingServices	Export	in progress
Autodesk	Revit Architecture	Architecture	Import & Export	Export: certified Import: in progress
Autodesk	Revit MEP	BuildingService	Import & Export	Export: certified Import: in progress
Autodesk	Revit Structure	Structural	Import & Export	Export: certified Import: in progress
Autodesk	Revit LT	Architecture	Import & Export	in progress
Bentley Systems	AECOSim Building Designer	Architecture	Import & Export	in progress
Cad-Quality	CAD-E-Share			
	CasCADus / PCL3D	Architecture	Import & Export	in progress
Gehry Technologies	Digital Project	Architecture	Import & Export	in progress
Graphisoft	ArchiCAD	Architecture	Import & Export	Export: certified Import: certified
International Training Institute ITI	Benchmark	BuildingService	Export	in progress

Certification

- Certification details
- Understand certification
- Importance to users
- Service to developers
- IFC Certification 2.0
 - IFC2x3 CV V2.0 Certification
 - How to participate

IFC2x certification

Search

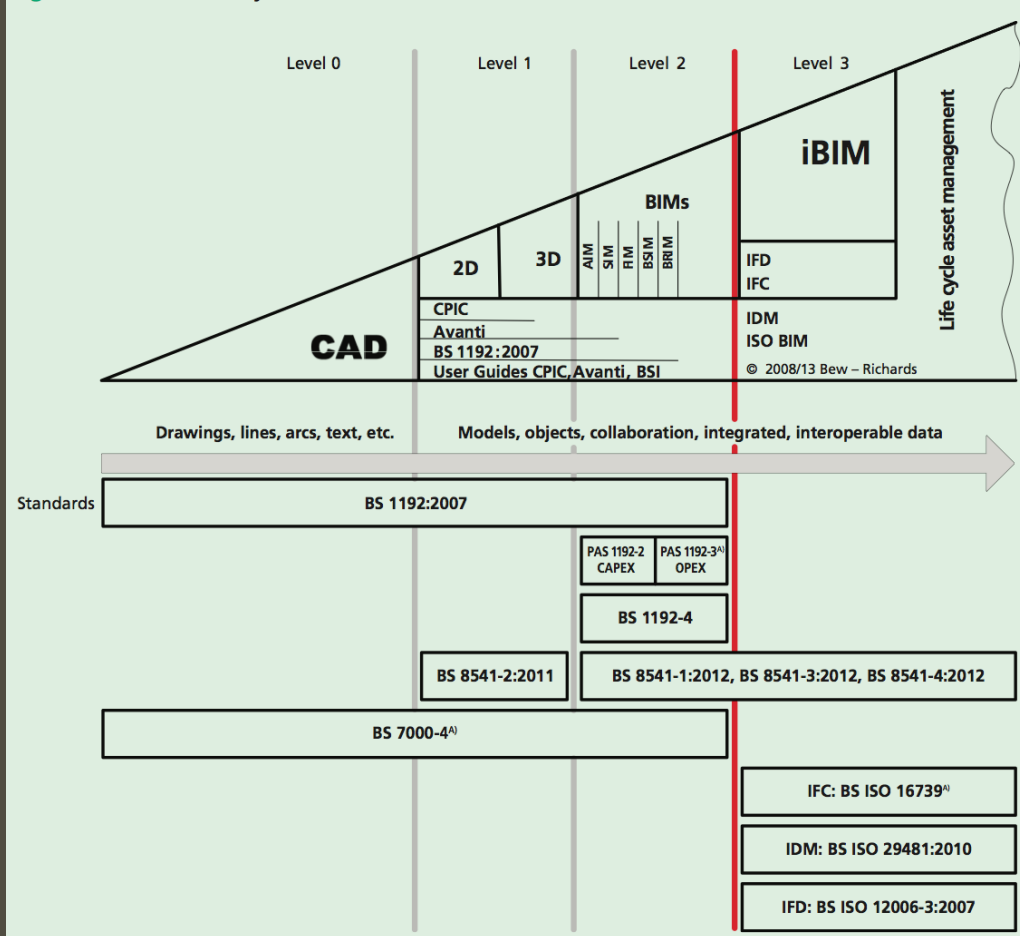


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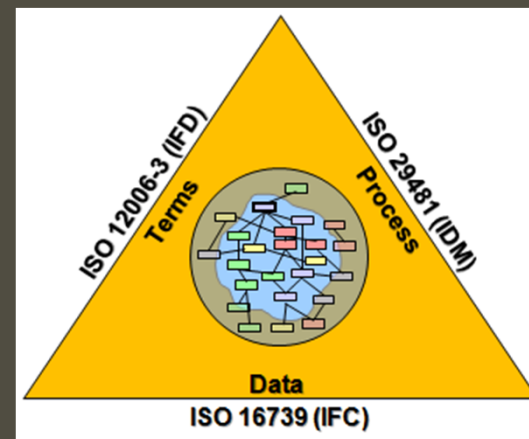
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IFC AND OPEN BIM

Figure 1 – BIM maturity levels

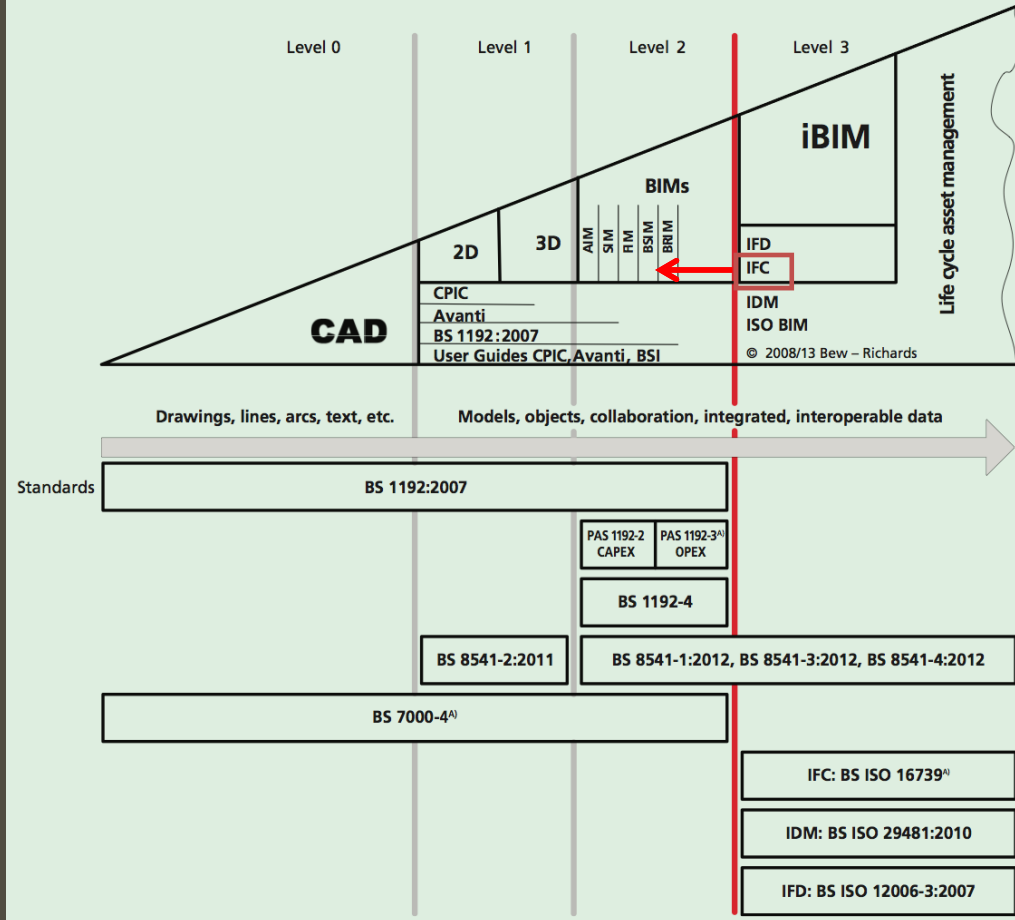


- UK government demonstrate that IFC along with IDM and IFD are the proposed standards for Level 3 BIM
- IFD = International Framework for Dictionaries
- IDM = Information Delivery Manual



IFC AND OPEN BIM

Figure 1 – BIM maturity levels

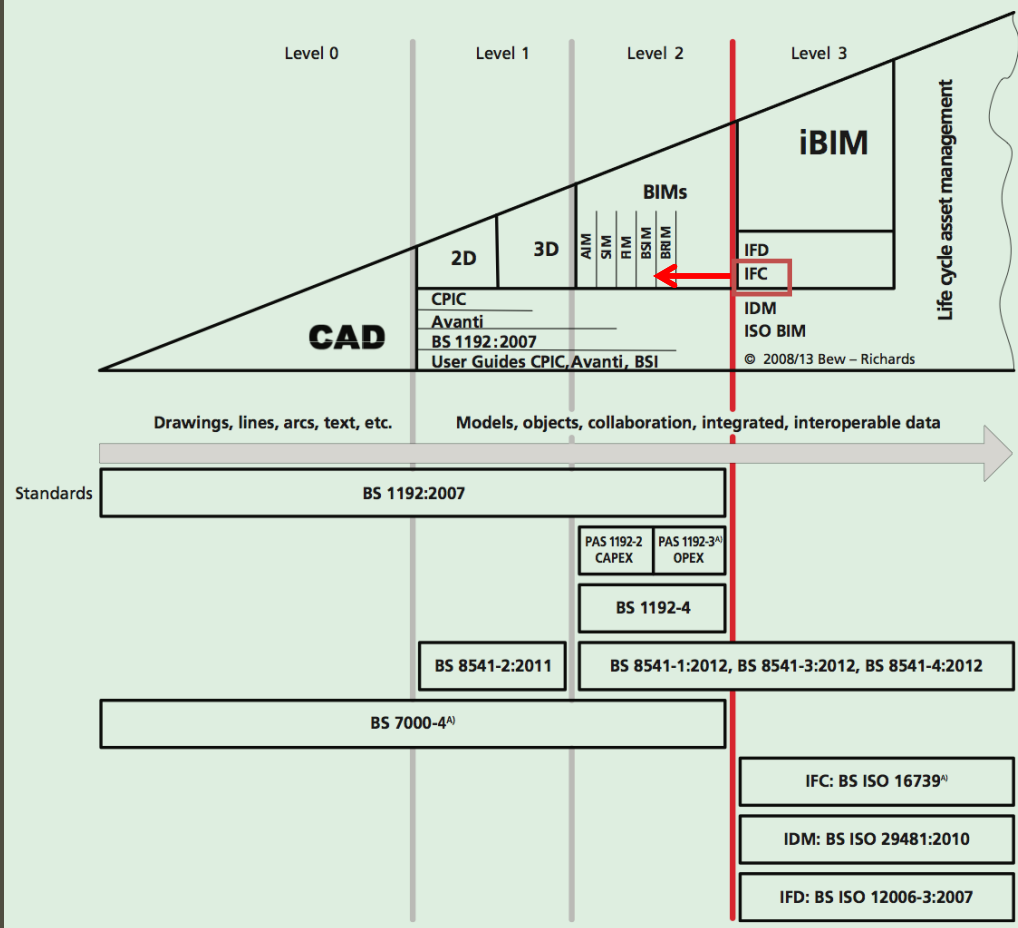


- UK government demonstrate that IFC along with IDM and IFD are the proposed standards for Level 3 BIM
- For many IFC is required at Level 2
- BIM Level “2.5”



IFC AND OPEN BIM

Figure 1 – BIM maturity levels



- COBie (the UK Government data requirement) is a subset of IFC

[illegible]

IFC AND OPEN BIM

Autodesk Revit – Bentley AECOsim – Graphisoft ArchiCAD – Solibri Model Checker and Viewer – Tekla BIMsight – Autodesk Navisworks – Bentley Navigator – Tekla Structures – Vico Office – Nemetschek Vectorworks – Nemetschek Allplan – 4MSA – ArTrA – Datacubist simplebim – Design Data Systems DDS-CAD – Kykloud – Synchro Professional – Gehry Technologies – Nemetschek Scia – Trimble Sketchup Pro – Constructivity – Bentley Microstation – Autodesk AutoCAD – Causeway BIMmeasure – 4projects – Asite cBIM – Bentley RAM – Bentley STAAD – ArchiBus – Innovaya – M-SIX VEO – Tekla BIMsight – Vintocon – Autodesk 360 Glue – Autodesk 360 Field – EcoDomus – Graphisoft BIMx – Exactal CostX – MagiCAD – AceCad – dRofus – Asta PowerProject – Tekla CM – Trimble Layout Solutions – Prolog Mobile – Modelogix – WinEst – Graytec Advance Design – Bentley Hevacomp – Onuma System – FM:Systems FM:Interact – xBIM – IES – Bluebeam – Oasys – etc etc

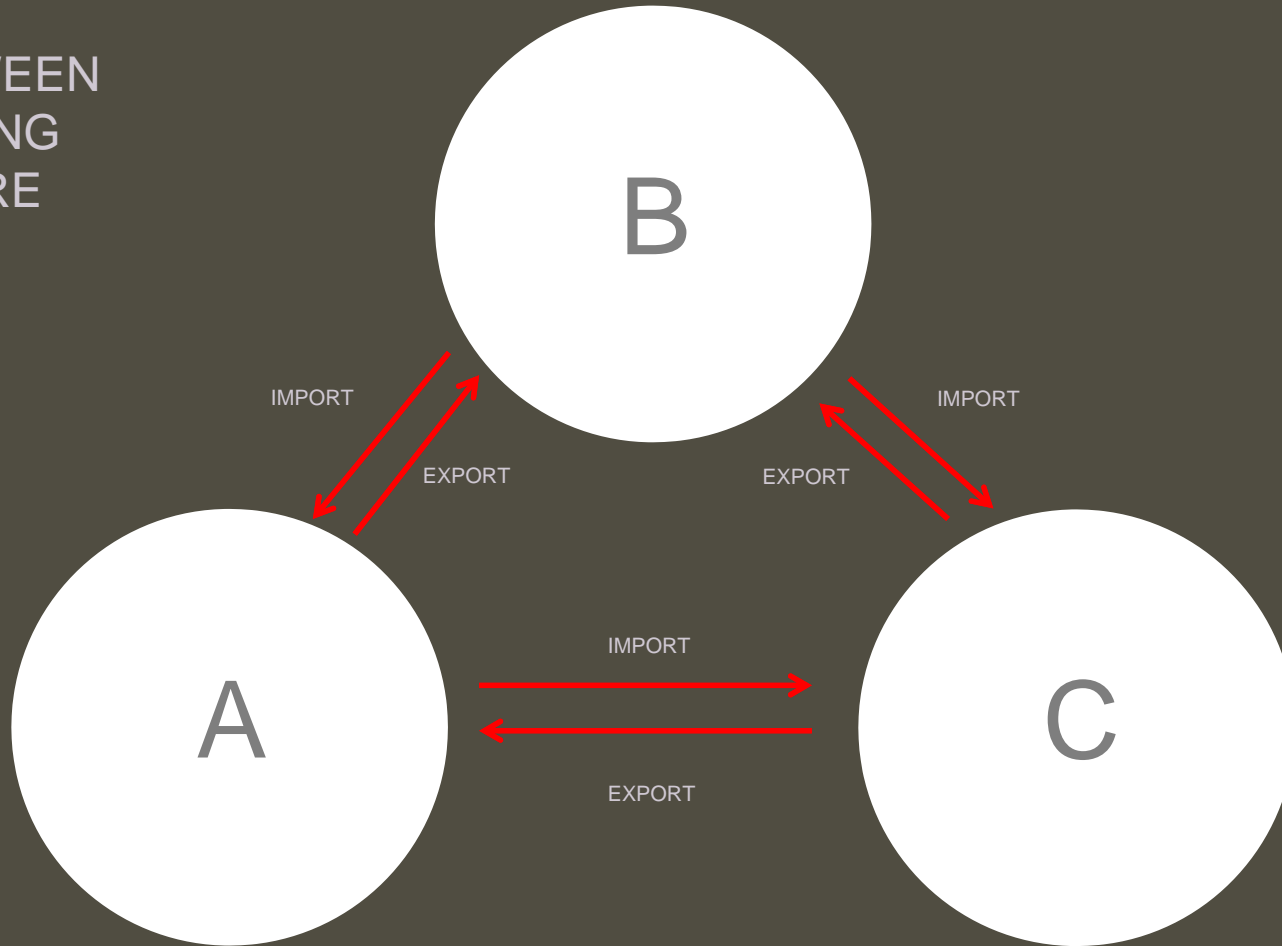


IFC: SCHRODINGER'S EXCHANGE FORMAT?



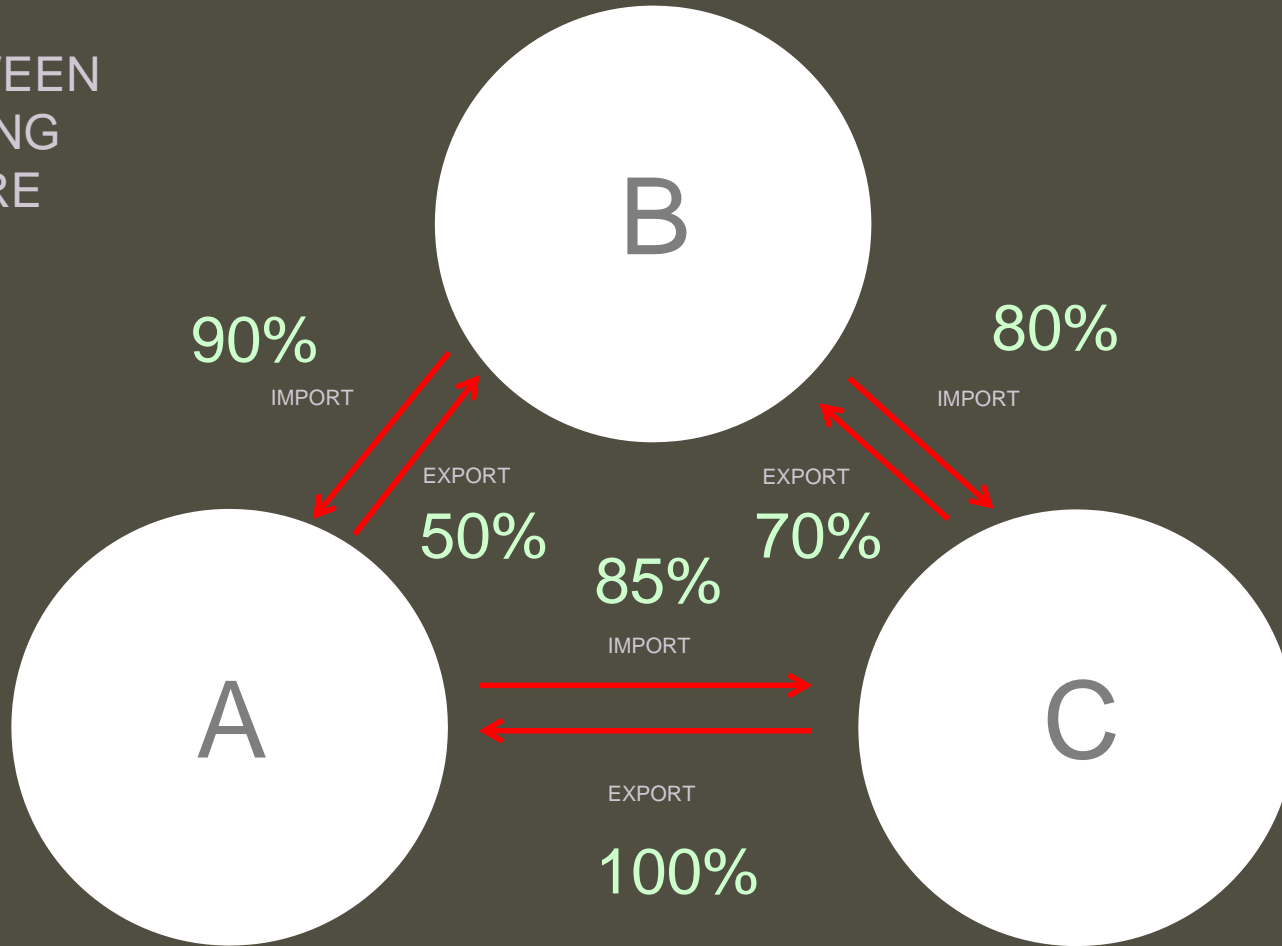
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IFC BETWEEN
AUTHORING
SOFTWARE



IFC AND OPEN BIM

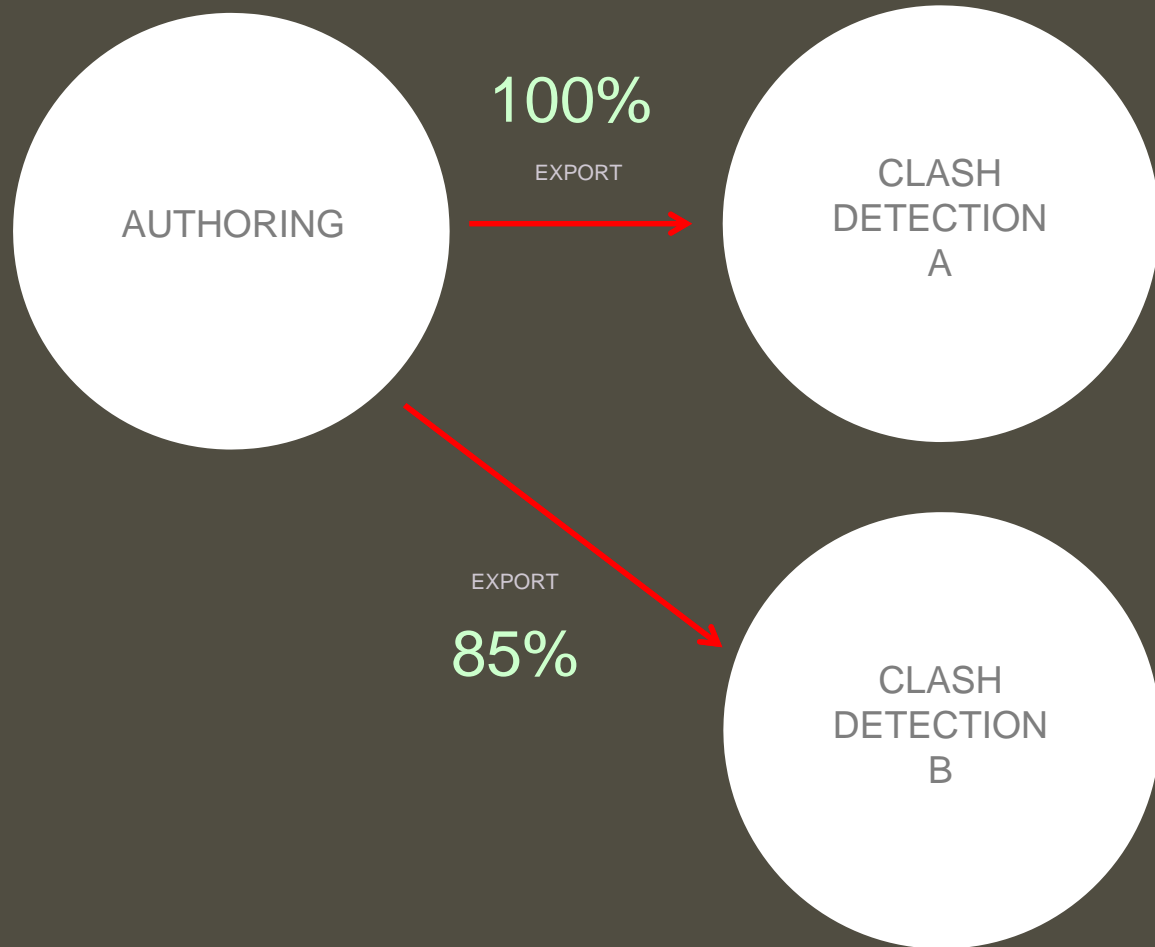
IFC BETWEEN
AUTHORING
SOFTWARE



IFC AND OPEN BIM

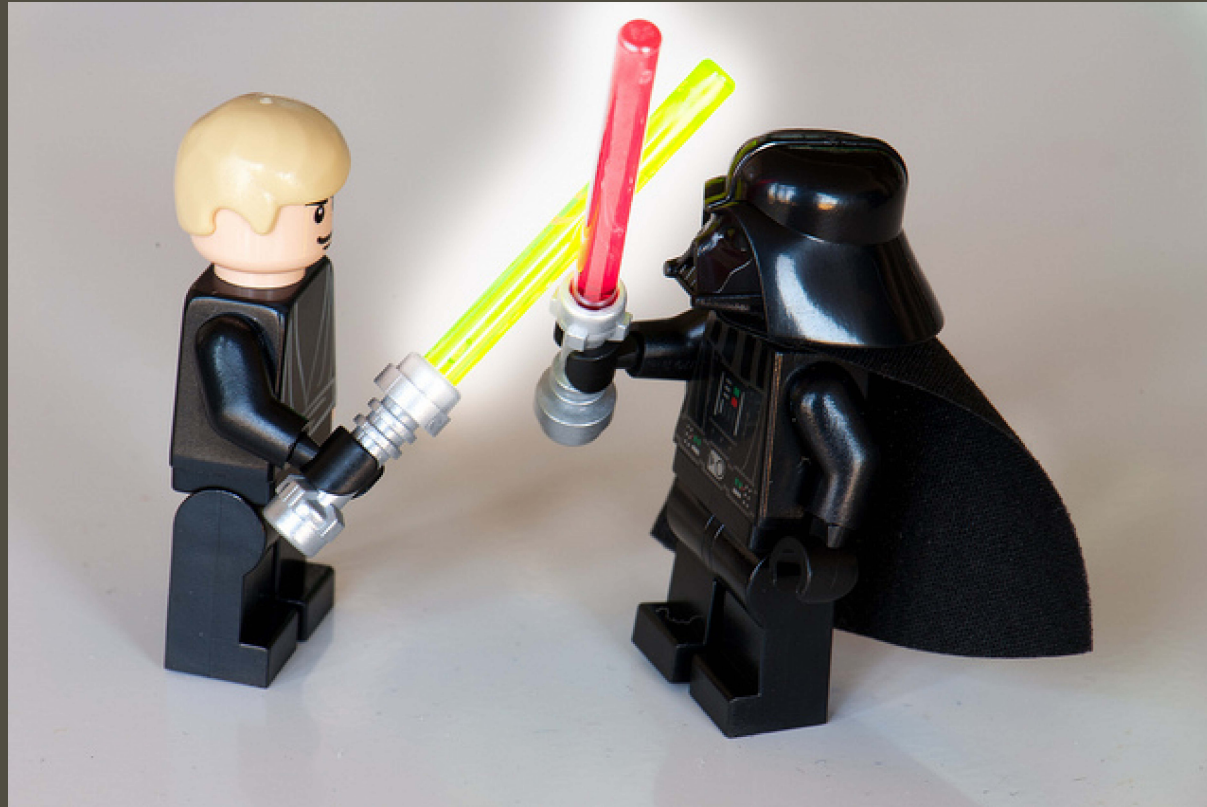
IFC BETWEEN AUTHORIZING
AND SPECIALIST
SOFTWARE

E.G.
CLASH DETECTION
COST
SEQUENCING
ANALYSIS
ETC.



IFC AND OPEN BIM

OPEN BIM vs Closed BIM



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“IFC DOESN'T WORK”

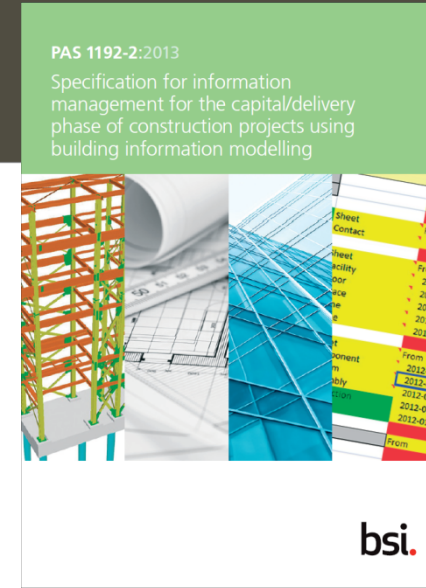


“IFC DOESN'T WORK”



PREPARATION & PLANNING

- Understanding the needs of the project
 - Plan your exchange requirements
 - IFC should never be the de facto exchange format
 - Relevant country standards e.g. PAS1192, AIA E202
 - AEC (UK) BIM Protocols
- BEP
 - Technical considerations for effective communications
 - Milestones
 - Intended BIM uses at each stage
 - Level of Development, Detail and Information
 - Standards, naming conventions



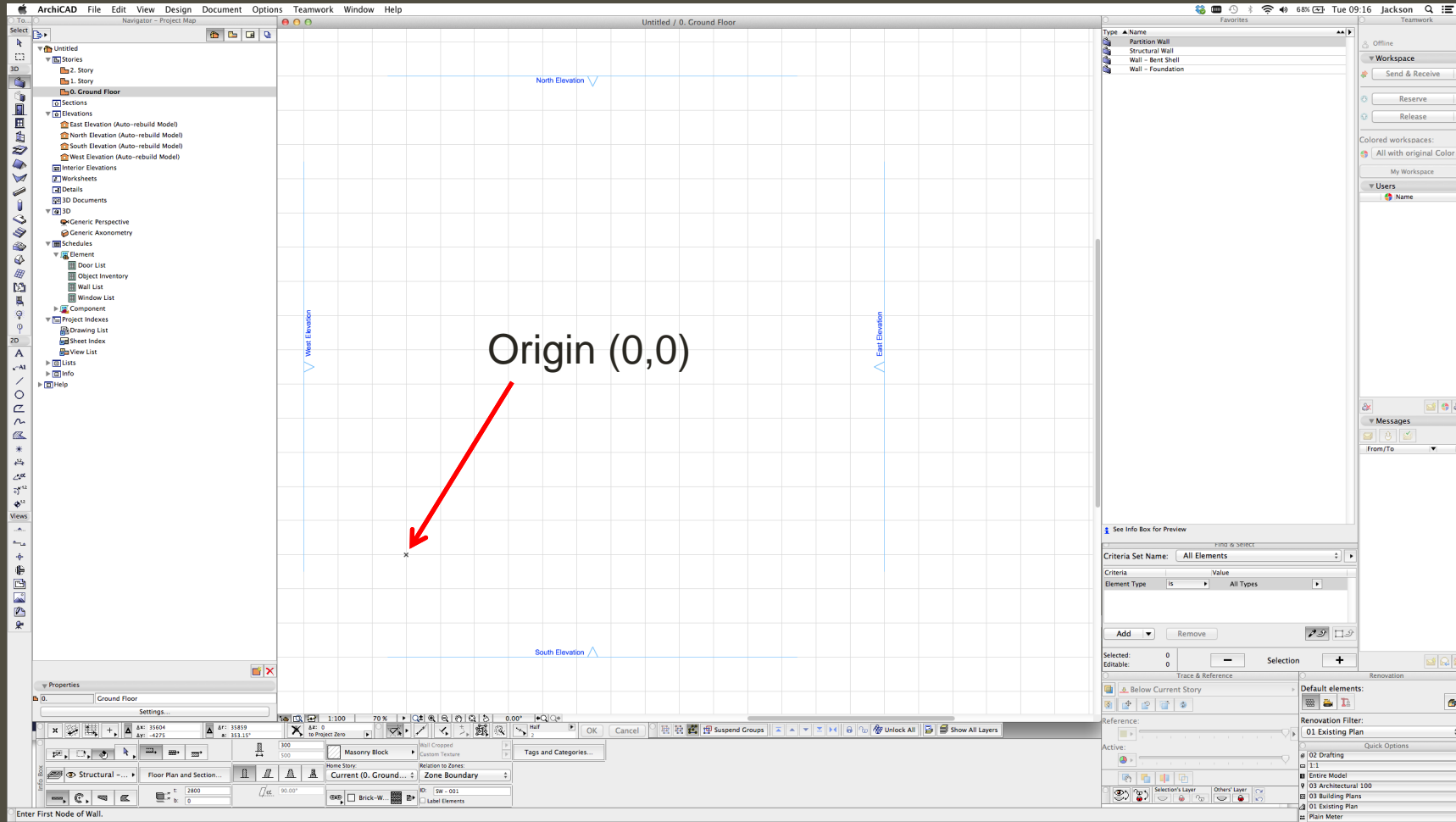
PREPARATION & PLANNING





GRAPHISOFT ArchiCAD

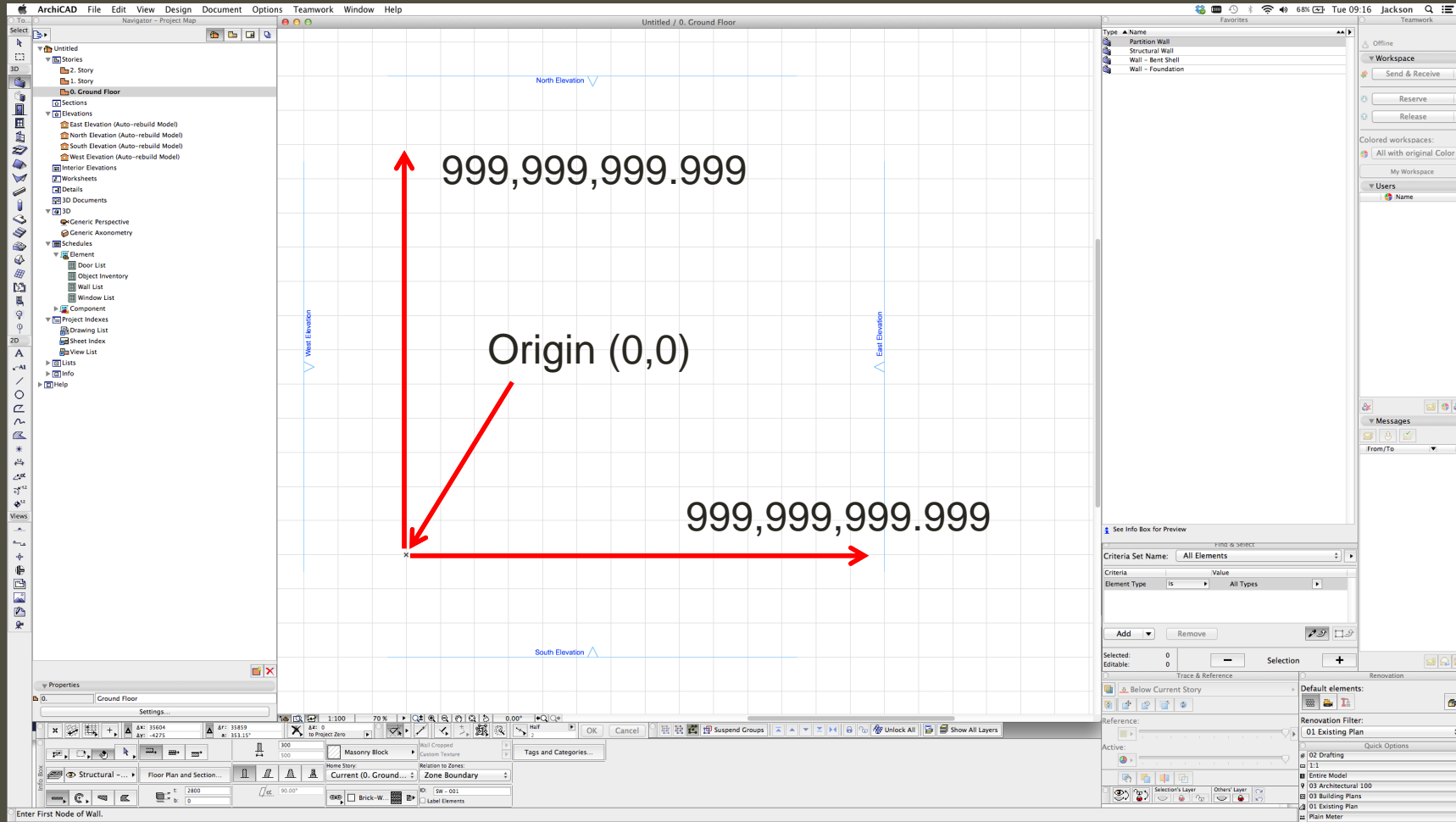
COORDINATING COORDINATES



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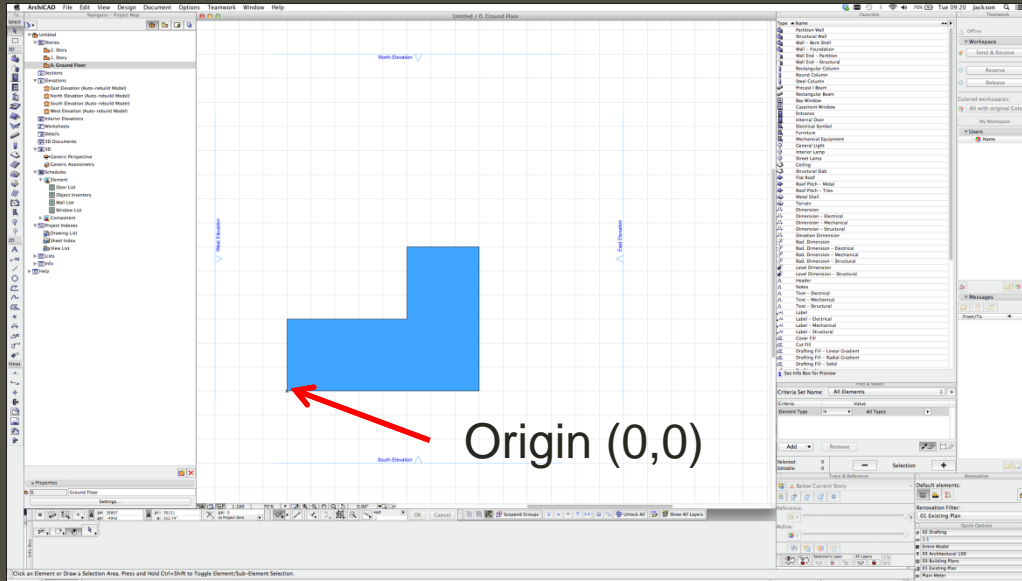
COORDINATING COORDINATES



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COORDINATING COORDINATES



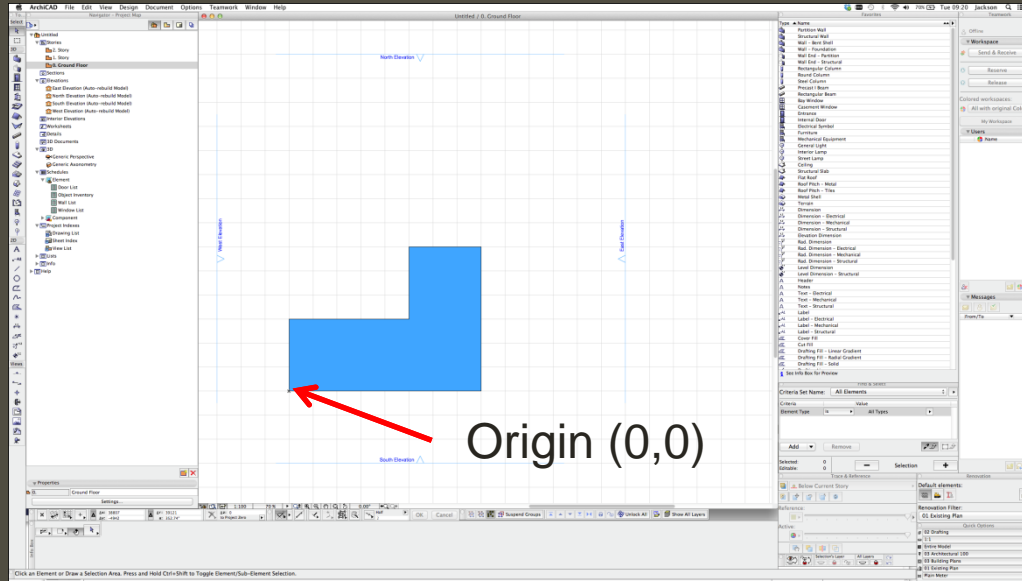
Building Model



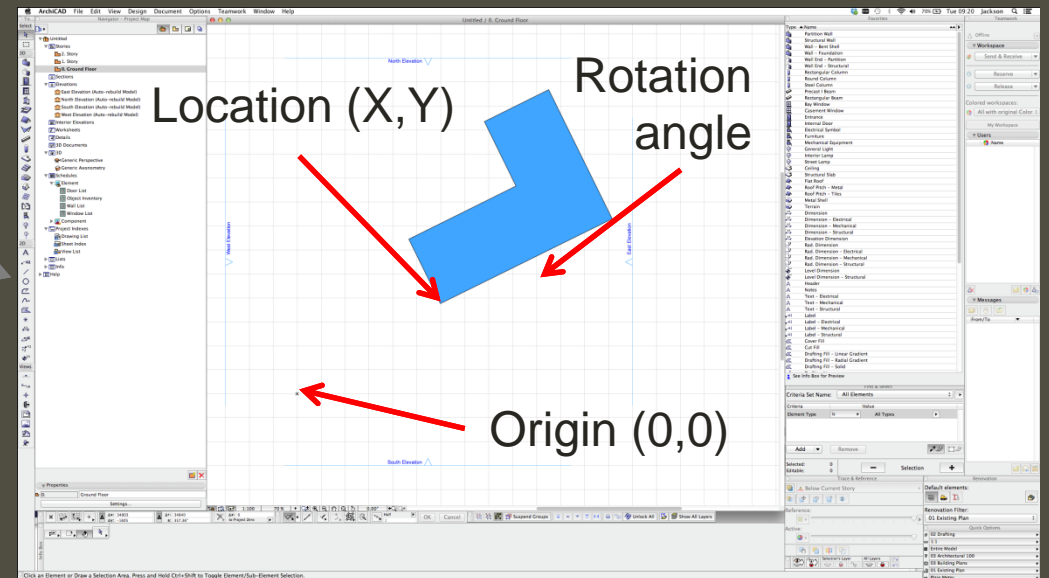
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COORDINATING COORDINATES



Building Model



Site Model



THE UGLY



ArchiCAD IFC to simplebim



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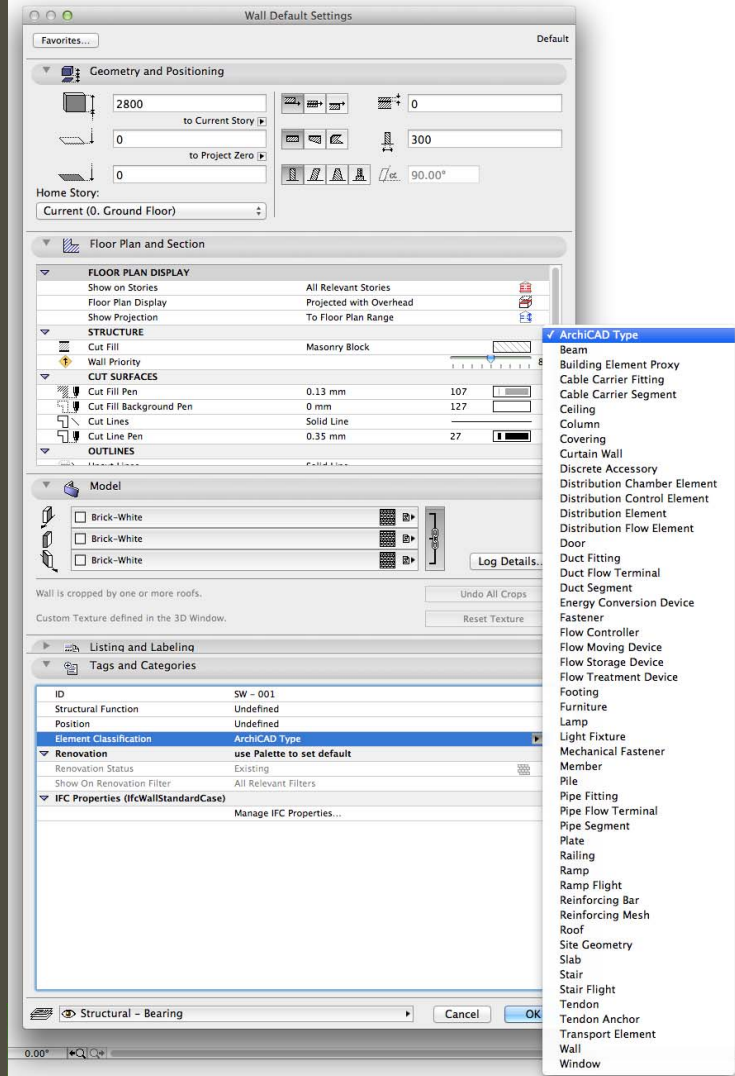
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MODELLING FOR IFC EXCHANGE

Design	
Wall	IfcWall
Door	IfcDoor
Window	IfcWindow
Column	IfcColumn
Beam	IfcBeam
Slab	IfcSlab (FLOOR)
Stair	IfcStair
Roof	IfcSlab (ROOF)
Shell	IfcSlab (ROOF)
Skylight	IfcWindow
Curtain Wall	IfcCurtainWall including IfcPlate (for panels) and IfcMember (for mullions and transoms)
Morph	IfcBuildingElementProxy
Object	<i>Varies depending on object selected</i>
Zone	IfcSpace
Mesh	IfcSiteGeometry
Y 2013	

More	
Grid Element	IfcGridAxis
Wall End	IfcWall
Corner-Window	IfcWindow
Lamp	IfcFlowTerminal

MODELLING FOR IFC EXCHANGE



No specific tools

e.g.

Ceiling

Footing

Floor finish

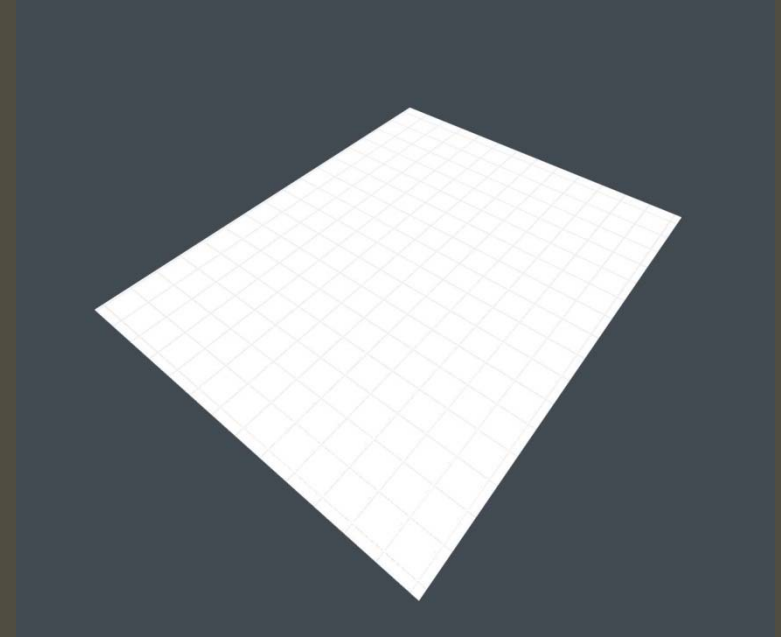
Lift

Pile

Railing

Ramp

Reinforcement



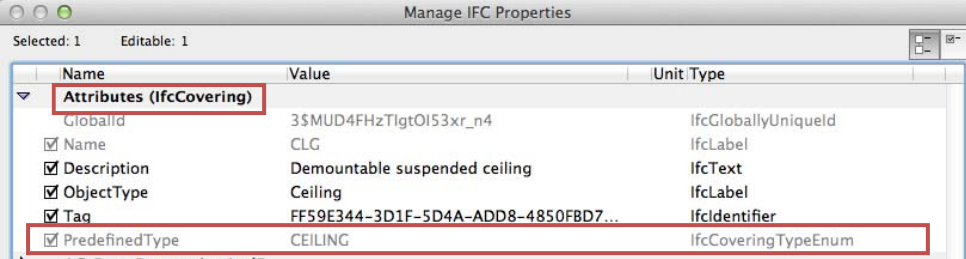
Ceiling could be modelled with the Slab tool

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MODELLING FOR IFC EXCHANGE

Predefined Types - IfcCovering

- IfcCovering (CEILING)
- IfcCovering (CLADDING)
- IfcCovering (FLOORING)
- IfcCovering (INSULATION)
- IfcCovering (MEMBRANE)
- IfcCovering (ROOFING)
- IfcCovering (SLEEVING)
- IfcCovering (WRAPPING)
- IfcCovering (NOT DEFINED)
- IfcCovering (USER DEFINED)



Name	Value	Unit/Type
Attributes (IfcCovering)		
<input type="checkbox"/> GlobalId	3\$MUD4FHzTlgtOI53xr_n4	IfcGloballyUniqueId
<input checked="" type="checkbox"/> Name	CLG	IfcLabel
<input checked="" type="checkbox"/> Description	Demountable suspended ceiling	IfcText
<input checked="" type="checkbox"/> ObjectType	Ceiling	IfcLabel
<input checked="" type="checkbox"/> Tag	FF59E344-3D1F-5D4A-ADD8-4850FBD7...	IfcIdentifier
<input checked="" type="checkbox"/> PredefinedType	CEILING	IfcCoveringTypeEnum



```
ENTITY IfcCovering;
  GlobalId : IfcGloballyUniqueId;
  OwnerHistory : IfcOwnerHistory;
  Name : OPTIONAL IfcLabel;
  Description : OPTIONAL IfcText;
  ENTITY IfcObjectDefinition;
  INVERSE
  HasAssignments : SET OF IfcRelAssigns FOR RelatedObjects;
  IsDecomposedBy : SET OF IfcRelDecomposes FOR RelatedObject;
  Decomposes : SET [0:1] OF IfcRelDecomposes FOR RelatedObjects;
  HasAssociations : SET OF IfcRelAssociates FOR RelatedObjects;
  ENTITY IfcObject;
  ObjectType : OPTIONAL IfcLabel;
  INVERSE
  IsDefinedBy : SET OF IfcRelDefines FOR RelatedObjects;
  ENTITY IfcProduct;
  ObjectPlacement : OPTIONAL IfcObjectPlacement;
  Representation : OPTIONAL IfcProductRepresentation;
  INVERSE
  ReferencedBy : SET OF IfcRelAssignsToProduct FOR RelatingProduct;
  ENTITY IfcElement;
  Tag : OPTIONAL IfcIdentifier;
  INVERSE
  HasStructuralMember : SET OF IfcRelConnectsStructuralElement FOR RelatingElement;
  FillsVoids : SET [0:1] OF IfcRelFillsElement FOR RelatedBuildingElement;
  ConnectedTo : SET OF IfcRelConnectsElements FOR RelatingElement;
  HasCoverings : SET OF IfcRelCoversBldgElements FOR RelatingBuildingElement;
  HasProjections : SET OF IfcRelProjectsElement FOR RelatingElement;
  ReferencedInStructures : SET OF IfcRelReferencedInSpatialStructure FOR RelatedElements;
  HasPorts : SET OF IfcRelConnectsPortToElement FOR RelatedElement;
  HasOpenings : SET OF IfcRelConnectsPortToElement FOR RelatingBuildingElement;
  IsConnectionRealization : SET OF IfcRelConnectsWithRealizingElements FOR RealizingElements;
  ProvidesBoundaries : SET OF IfcRelSpaceBoundary FOR RelatedBuildingElement;
  ConnectedFrom : SET OF IfcRelConnectsElements FOR RelatedElement;
  ContainedInStructure : SET [0:1] OF IfcRelContainedInSpatialStructure FOR RelatedElements;
  ENTITY IfcBuildingElement;
  PredefinedType : OPTIONAL IfcCoveringTypeEnum;
  INVERSE
  CoversSpaces : SET [0:1] OF IfcRelCoversSpaces FOR RelatedCoverings;
  Covers : SET [0:1] OF IfcRelCoversBldgElements FOR RelatedCoverings;
END_ENTITY;
```



MODELLING FOR IFC EXCHANGE

- Default information
 - GlobalId (or GUID)
- Minimum for geometry exchange
 - Geometry
 - Location
 - Surface colour
 - Structural Function (LoadBearing)
 - Position (IsExternal)
 - Element Classification
 - Renovation Status
 - Layer

Geometry and Positioning

2800 to Current Story ▾

0 to Project Zero ▾

Home Story: Current (0. Ground Floor) ▾

0 90.00°

Model

☐ Brick-White

☐ Brick-White

☐ Brick-White

Log Details...

Tags and Categories

ID	SW - 001
Structural Function	Undefined
Position	Undefined
Element Classification	ArchiCAD Type
Renovation	use Palette to set default
Renovation Status	Existing
Show On Renovation Filter	All Relevant Filters
IFC Properties (IfcWallStandardCase)	Manage IFC Properties...

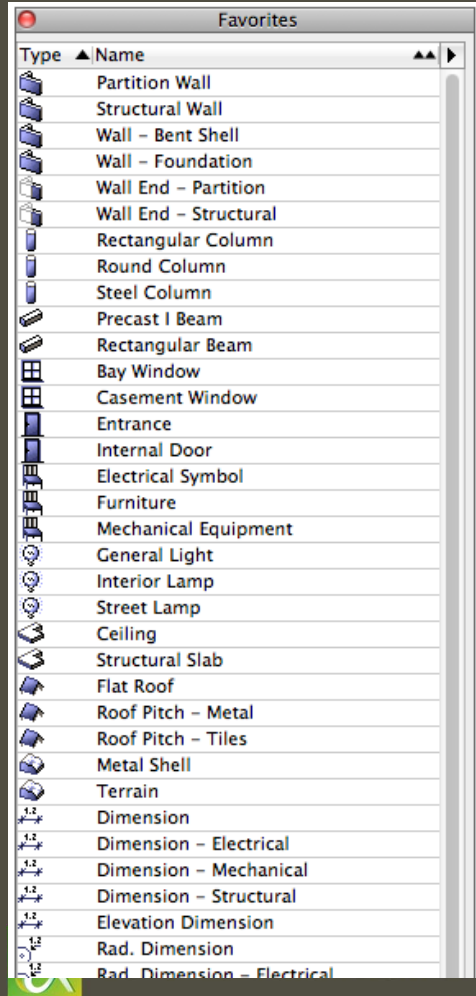
Finish - Wall

Cancel OK



MODELLING FOR IFC EXCHANGE

Favourites



- Surface colour
- Structural Function (LoadBearing)
- Position (IsExternal)
- Element Classification
- Renovation Status
- Layer
- ID (or Name)
- Material (fill in ArchiCAD)
- Description
- Data – IFC
- Data – Custom
- Classification (e.g. Uniclass/CAWS or Uniclass2, NRM etc)

MODELLING FOR IFC AND COBIE EXCHANGE

Manage IFC Properties

Default

Name	Value	Unit Type
Attributes (IfcWallStandardCase)		
GlobalId		IfcGloballyUniqueId
<input checked="" type="checkbox"/> Name	SW_001	IfcLabel
<input checked="" type="checkbox"/> Description	Description	IfcText
<input checked="" type="checkbox"/> ObjectType	Object Type	IfcLabel
<input checked="" type="checkbox"/> Tag		IfcIdentifier
AC_Pset_RenovationAndPhasing		
Renovation Status	Existing	IfcLabel
BBA_Pset_General		
<input checked="" type="checkbox"/> NBSClause	NBS Clause	IfcLabel
<input checked="" type="checkbox"/> Role	Role	IfcLabel
<input checked="" type="checkbox"/> Zone	Zone	IfcLabel
Pset_WallCommon		
<input checked="" type="checkbox"/> AcousticRating	Acoustic Rating	IfcLabel
<input checked="" type="checkbox"/> Combustible	FALSE	IfcBoolean
<input checked="" type="checkbox"/> Compartmentation	FALSE	IfcBoolean
<input checked="" type="checkbox"/> ExtendToStructure	FALSE	IfcBoolean
<input checked="" type="checkbox"/> FireRating	Fire Rating	IfcLabel
<input type="checkbox"/> IsExternal	FALSE	IfcBoolean
<input type="checkbox"/> LoadBearing	FALSE	IfcBoolean
<input checked="" type="checkbox"/> Reference	Reference	IfcIdentifier
<input checked="" type="checkbox"/> SurfaceSpreadOfFlame	Surface Spread Of Flame	IfcLabel
<input checked="" type="checkbox"/> ThermalTransmittance	0	IfcThermalTransmittanceMeasure

Create Property/Classification... Apply Predefined Rule...

Cancel OK

COBie

ExtIdentifier

Name

Description

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ArchiCAD language

IFC language

GlobalId	=	GUID	
ID	=	Name	(Revit 2014 – NameOverride)
Fill (cut)	=	Material	
Position	=	IsExternal	
Project Name	=	Building Name	
Reference	=	Type	
Storey	=	Floor	
Structural Function	=	LoadBearing	
Tag	=	BATID (Solibri)	
Zone	=	Space	



EXPORT OPTIONS – ARCHICAD

- Format
 - IFC2x3
 - IFC2x3 XML
 - IFC 2x3 compressed
 - IFC 2x3 XML compressed
- IFC Coordination View v1 & v2

▼ Model Element Filter

Filter Model Elements to Convert by

IFC Domain: All Options...

Structural Function: All elements

☐ Convert annotations and all 2D elements ☒ Convert grid elements

▼ Export Options

Elements to export: Visible elements (on all stories)

Derived model data to export: Options...

IFC View Definition: Coordination View Version 1.0

Extended Model View name:

☐ Surface Geometry (BREP geometries only)

IFC Site geometry: As boundary representation (BREP)

Complex elements: Options...

IFC model units: Options...

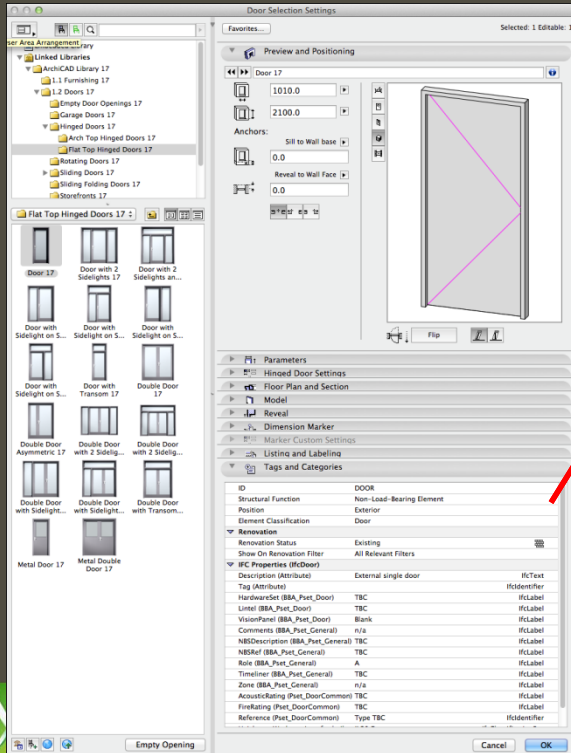
Global Unique Identifiers (GUID): Keep existing (recommended)

IFC file encoding: ANSI – for compatibility mode

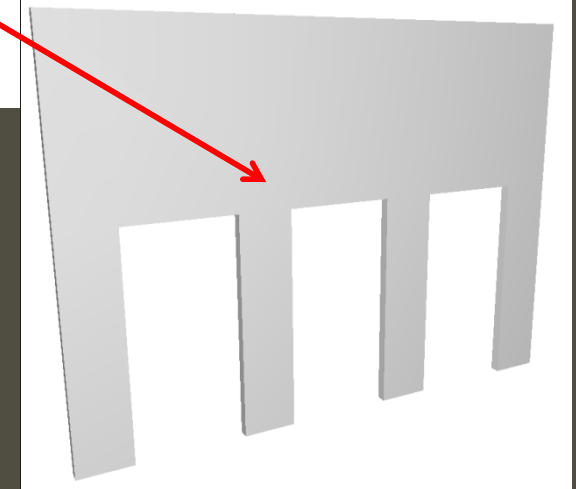
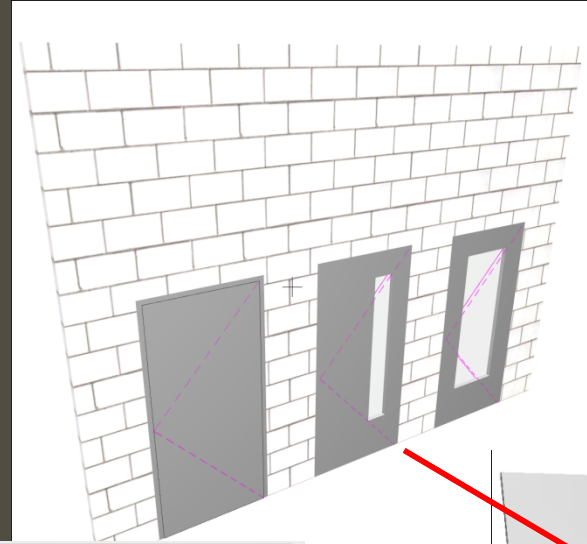


MODELLING FOR IFC EXCHANGE

- Structural Function (LoadBearing)
 - Load-Bearing Element
 - Non-Load-Bearing Element
 - Undefined

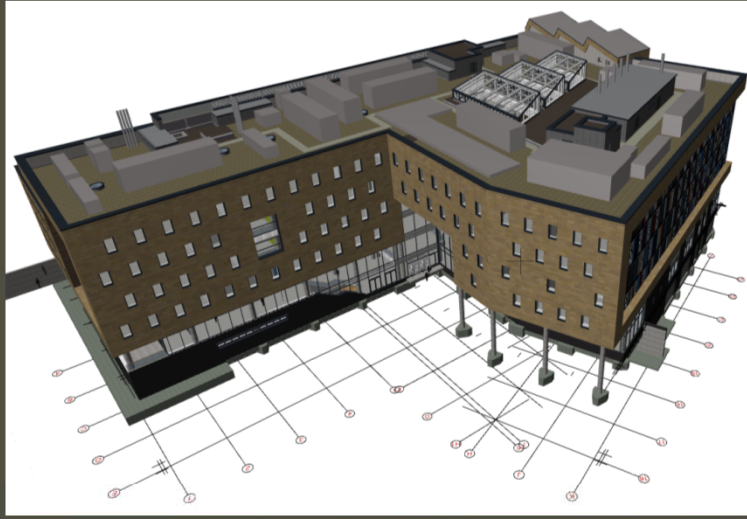


Tags and Categories		
ID	DOOR	
Structural Function	Non-Load-Bearing Element	
Position	Exterior	
Element Classification	Door	
▼ Renovation		
Renovation Status	Existing	
Show On Renovation Filter	All Relevant Filters	
▼ IFC Properties (IfcDoor)		
Description (Attribute)	External single door	IfcText
Tag (Attribute)		IfcIdentifier
HardwareSet (BBA_Pset_Door)	TBC	IfcLabel
Lintel (BBA_Pset_Door)	TBC	IfcLabel
VisionPanel (BBA_Pset_Door)	Blank	IfcLabel
Comments (BBA_Pset_General)	n/a	IfcLabel
NBSDescription (BBA_Pset_General)	TBC	IfcLabel
NBSRef (BBA_Pset_General)	TBC	IfcLabel
Role (BBA_Pset_General)	A	IfcLabel
Timeliner (BBA_Pset_General)	TBC	IfcLabel
Zone (BBA_Pset_General)	n/a	IfcLabel
AcousticRating (Pset_DoorCommon)	TBC	IfcLabel
FireRating (Pset_DoorCommon)	TBC	IfcLabel
Reference (Pset_DoorCommon)	Type TBC	IfcIdentifier



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TECHNICALITIES

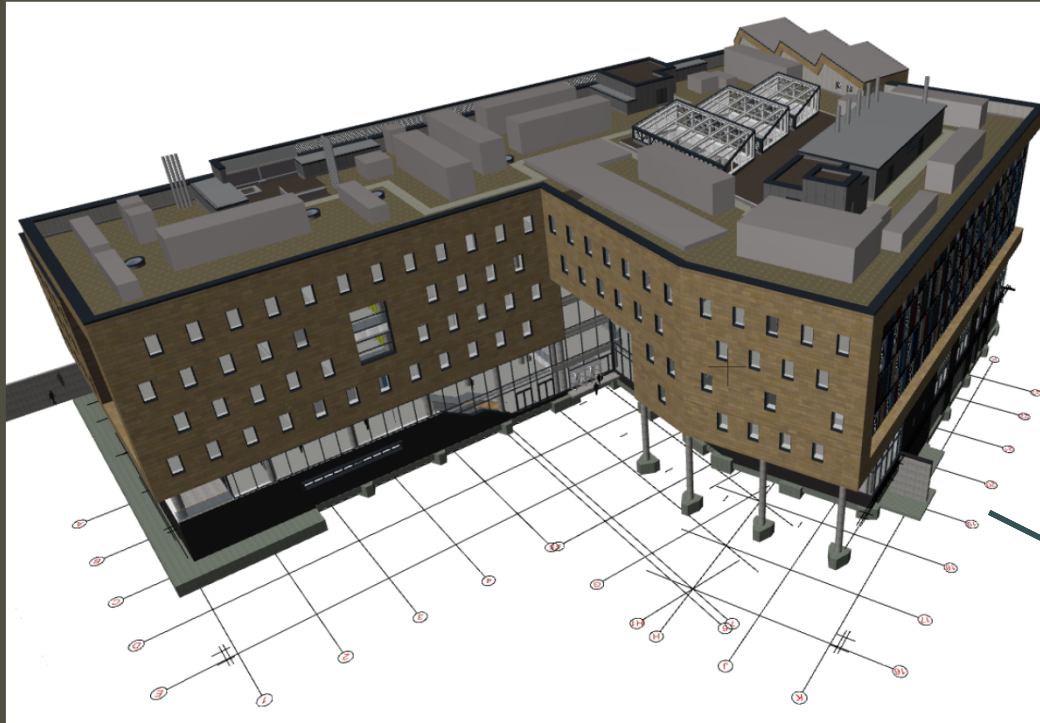


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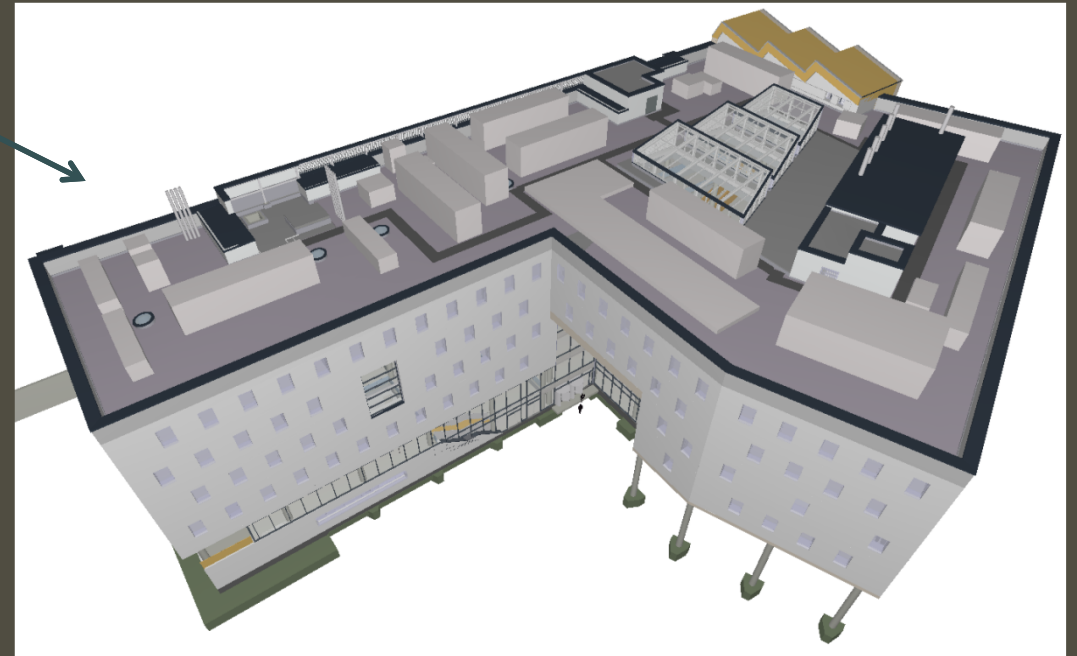
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TECHNICALITIES

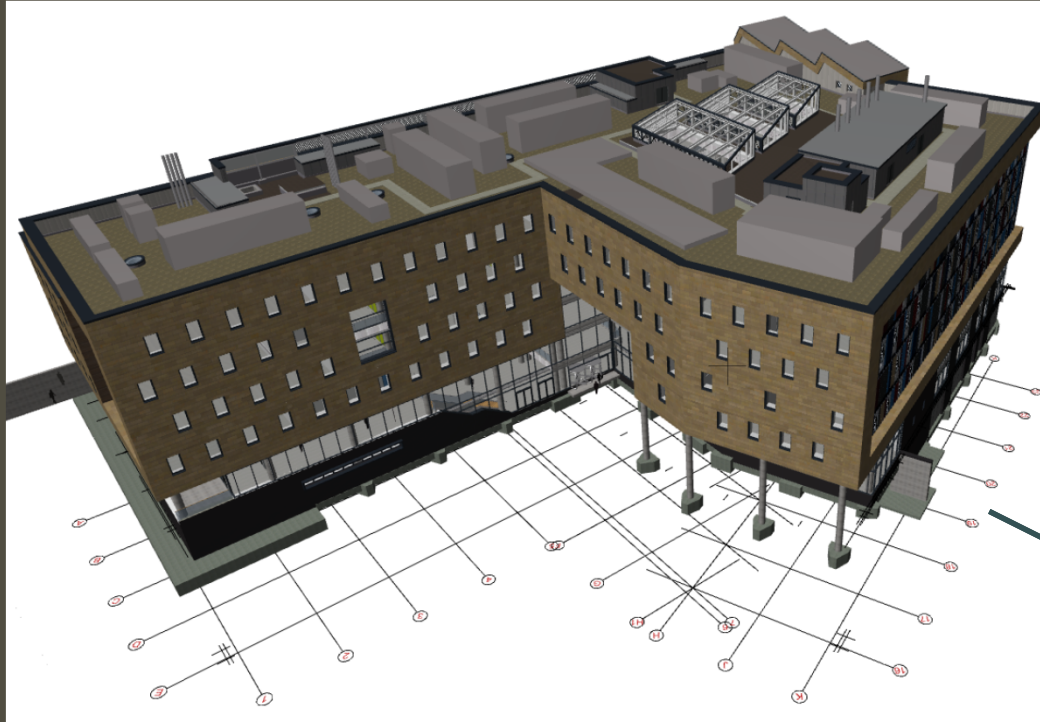


ArchiCAD 16

Solibri Model Viewer v7

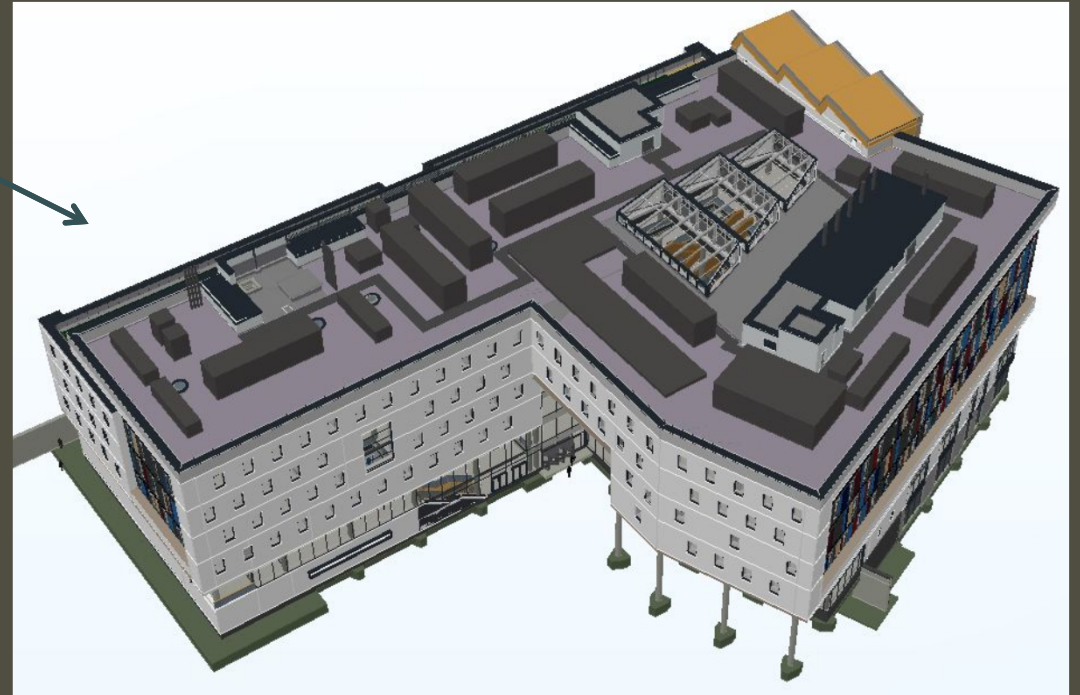


TECHNICALITIES

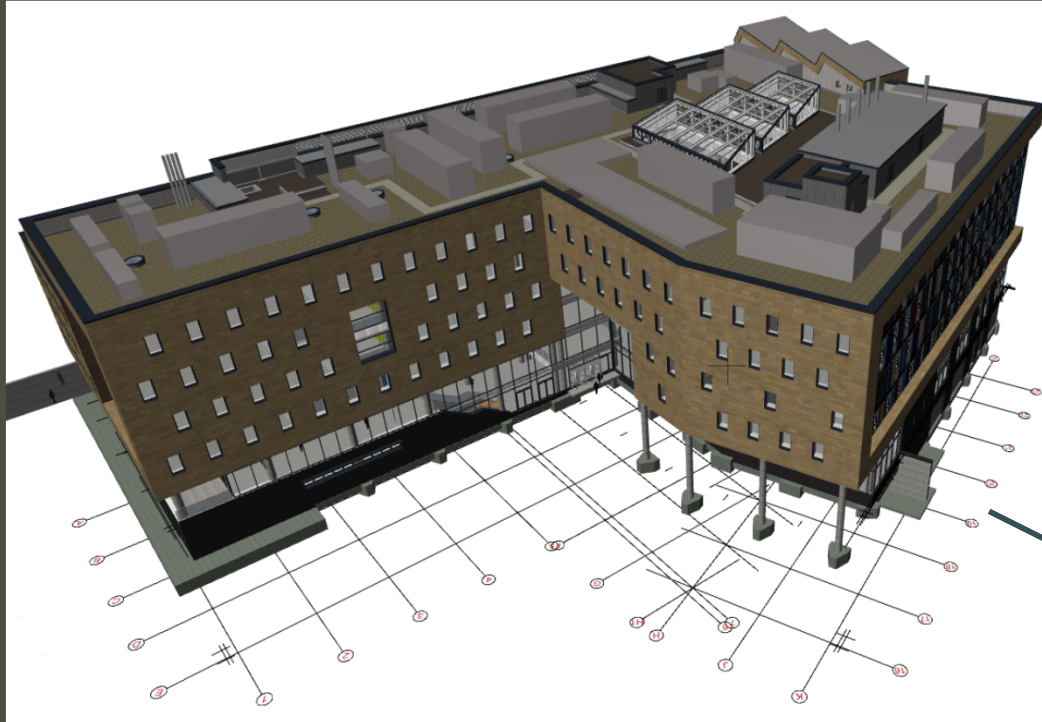


ArchiCAD 16

Tekla BIMsight v1.7.1

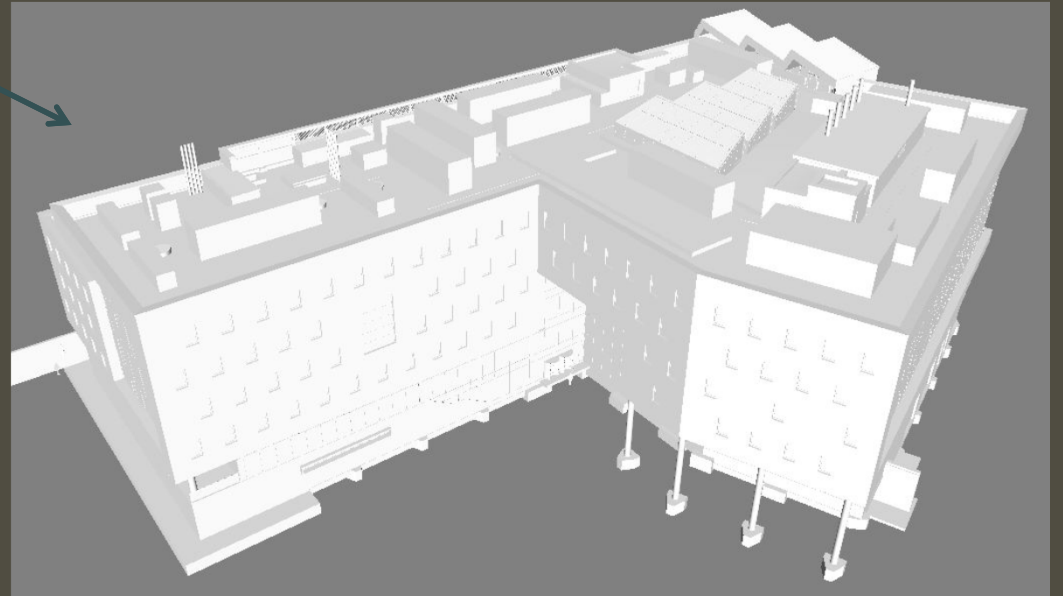


TECHNICALITIES

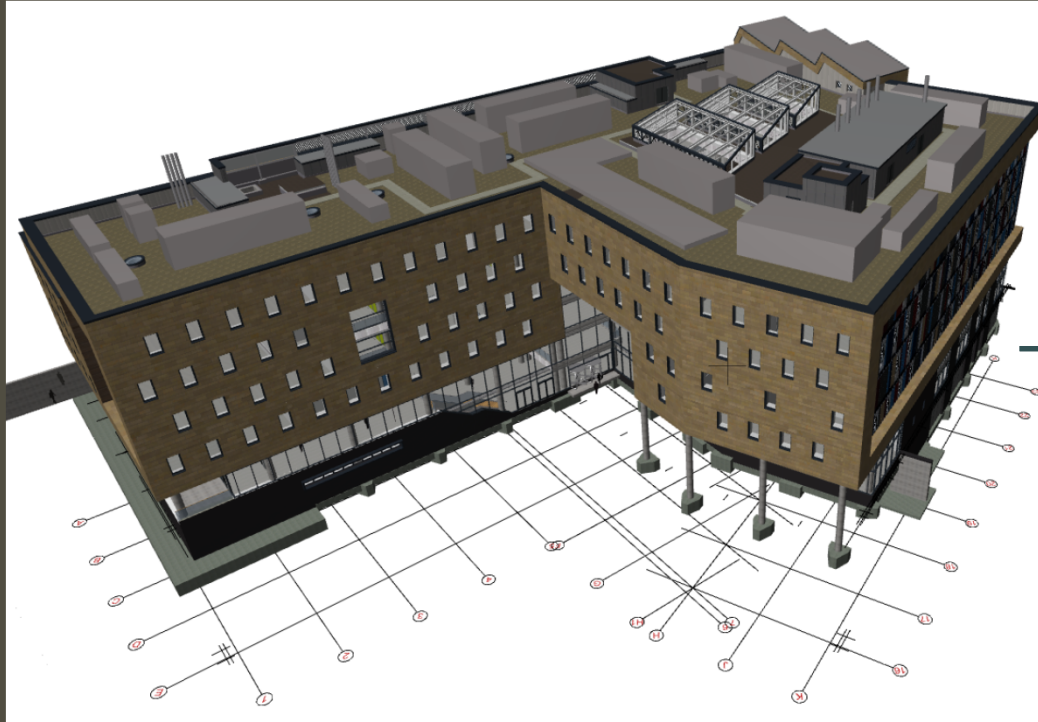


ArchiCAD 16

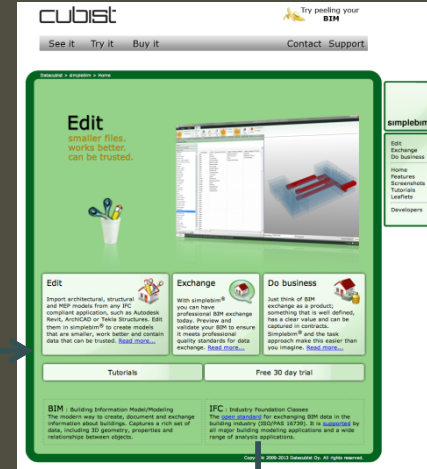
Navisworks 2013



TECHNICALITIES



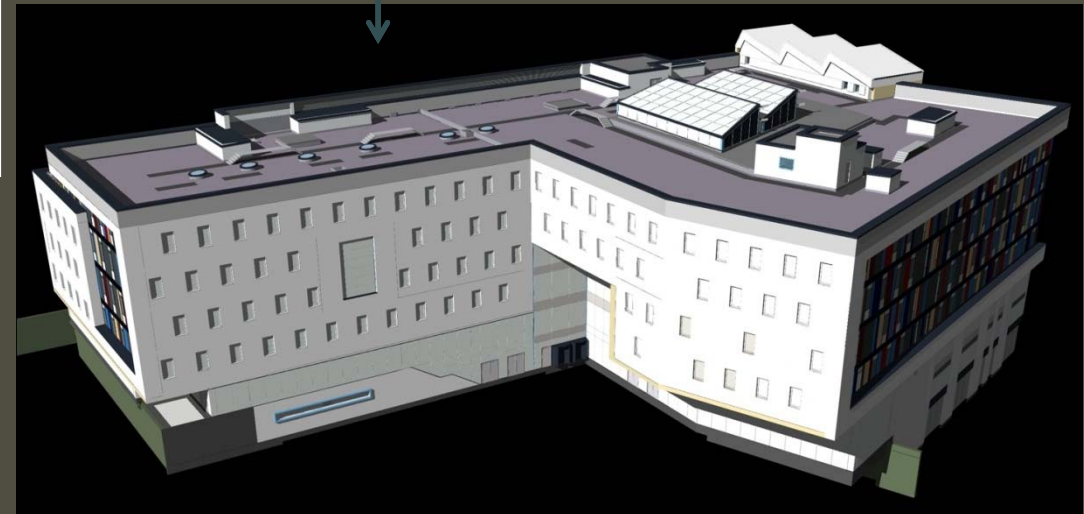
ArchiCAD 16



Adam Ward
@Revitspace
#ukbimcrew

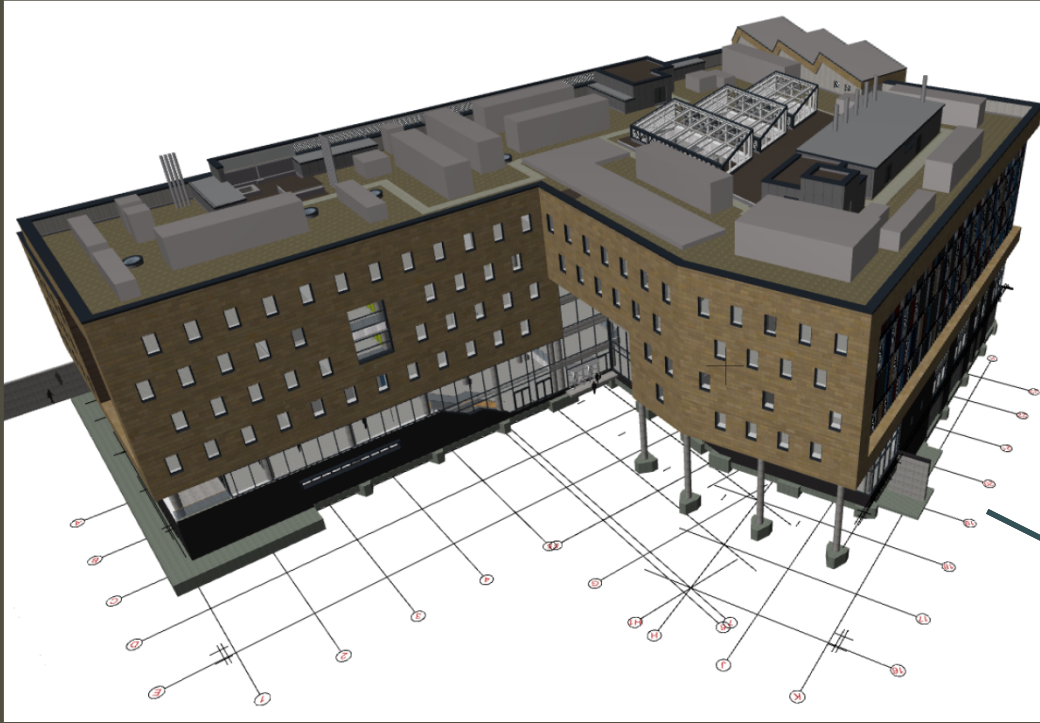
Datacubist
simplebim

Navisworks 2013
via simplebim



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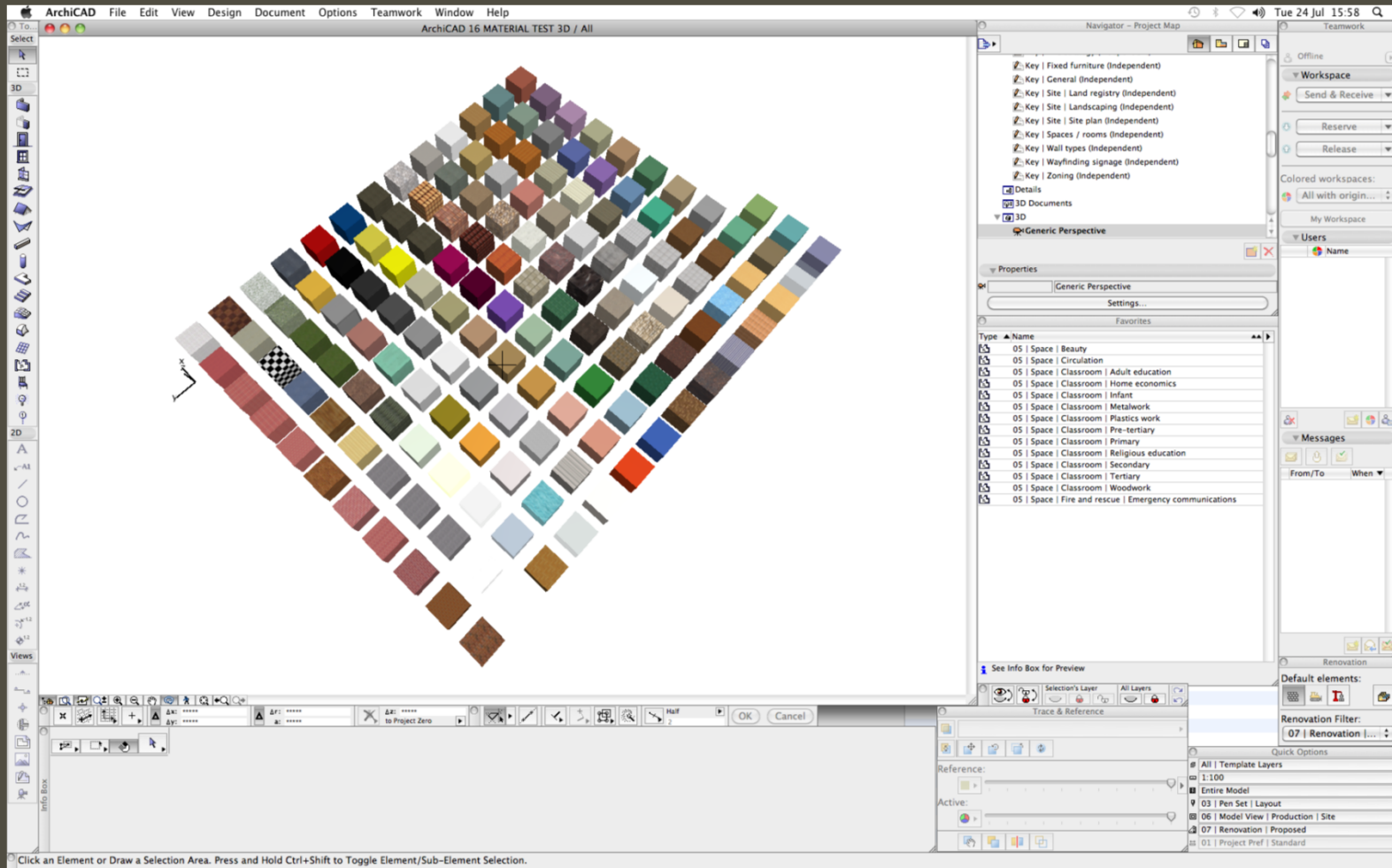


ArchiCAD 16

Navisworks 2014



TECHNICALITIES



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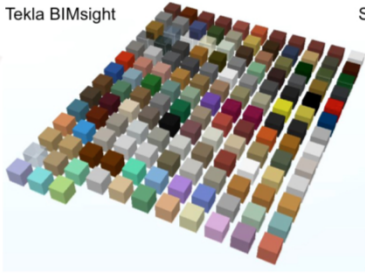
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TECHNICALITIES

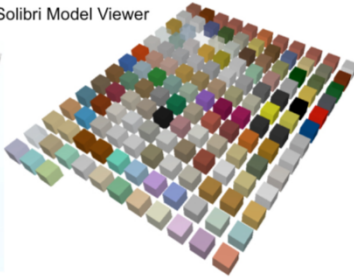
Graphisoft ArchiCAD



Tekla BIMsight



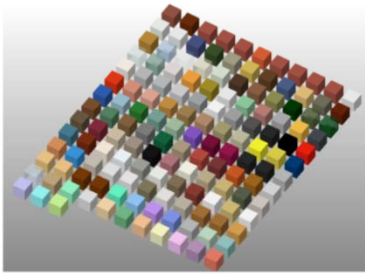
Solibri Model Viewer



DDS-CAD



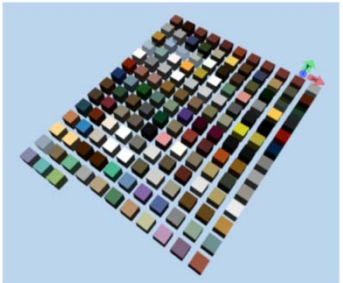
Datacubist simplebim



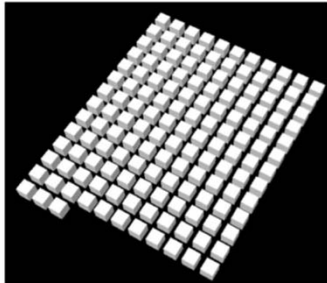
Vico

AWAITING IMAGE

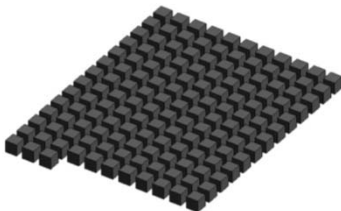
Bentley Navigator



Autodesk Navisworks

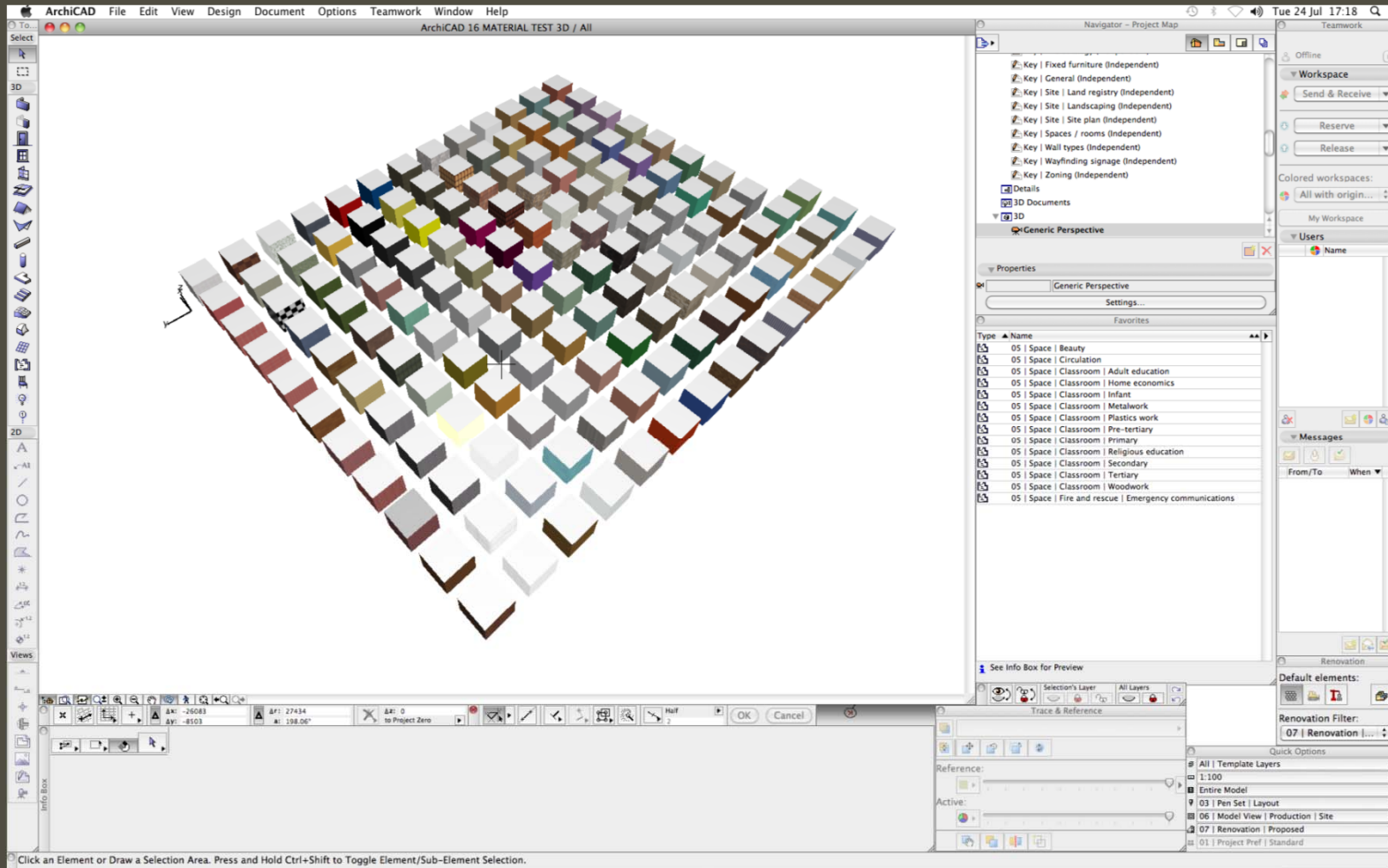


Autodesk Revit



IFC THE GOOD THE BAD THE UGLY
#AU2013

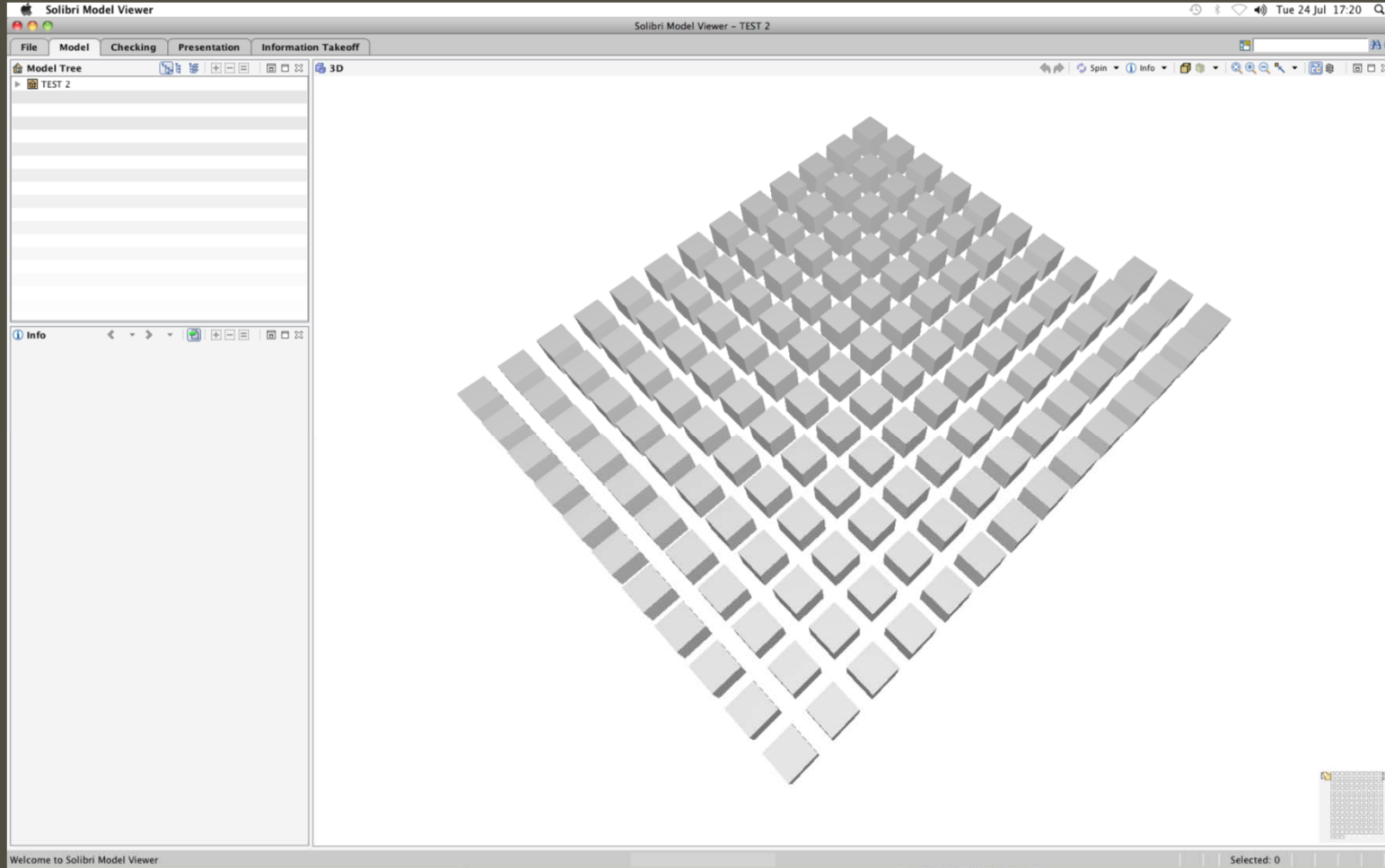
TECHNICALITIES



AUTODESK UNIVERSITY 2013

IFC THE GOOD THE BAD THE UGLY
#AU2013

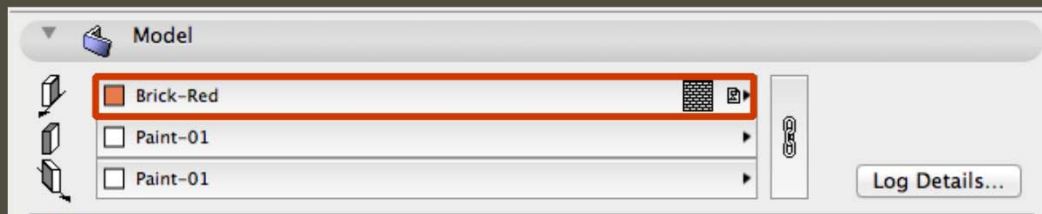
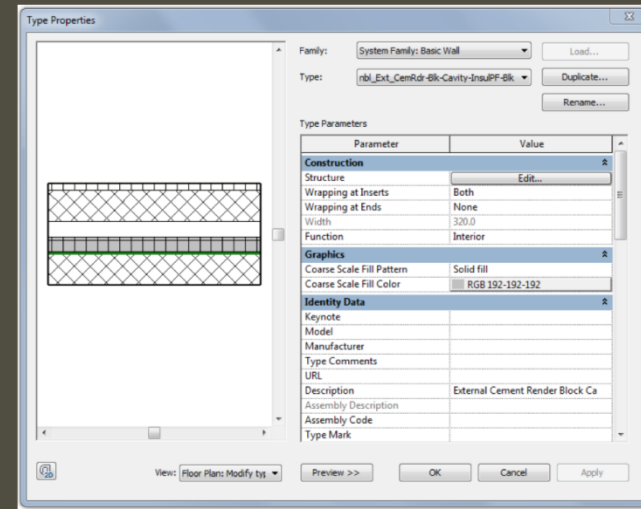
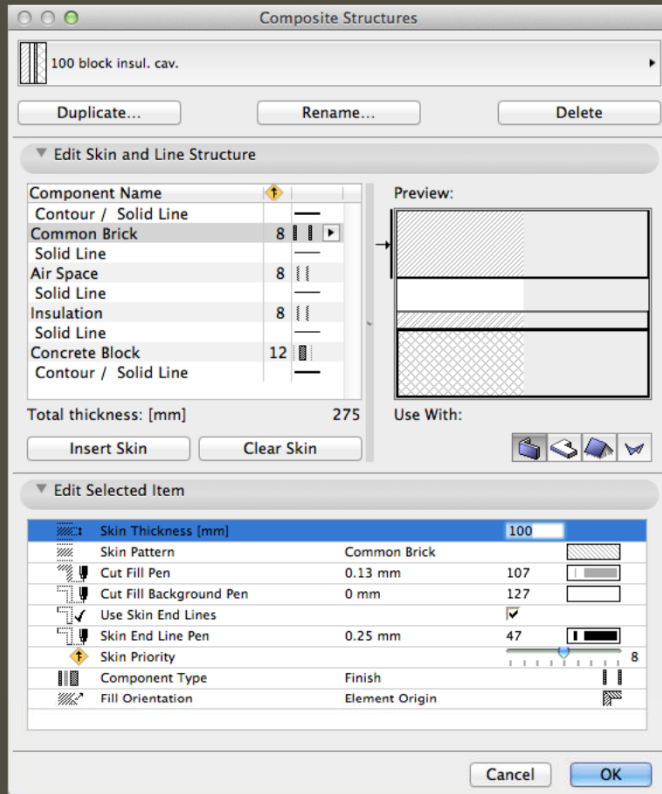
TECHNICALITIES



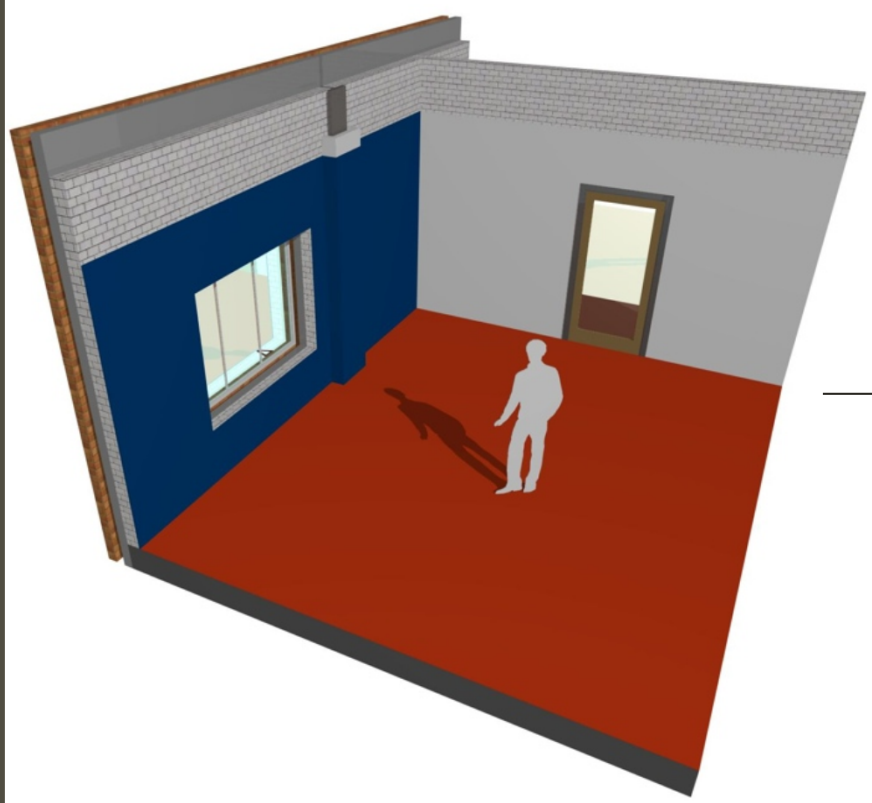
AUTODESK UNIVERSITY 2013

IFC THE GOOD THE BAD THE UGLY
#AU2013

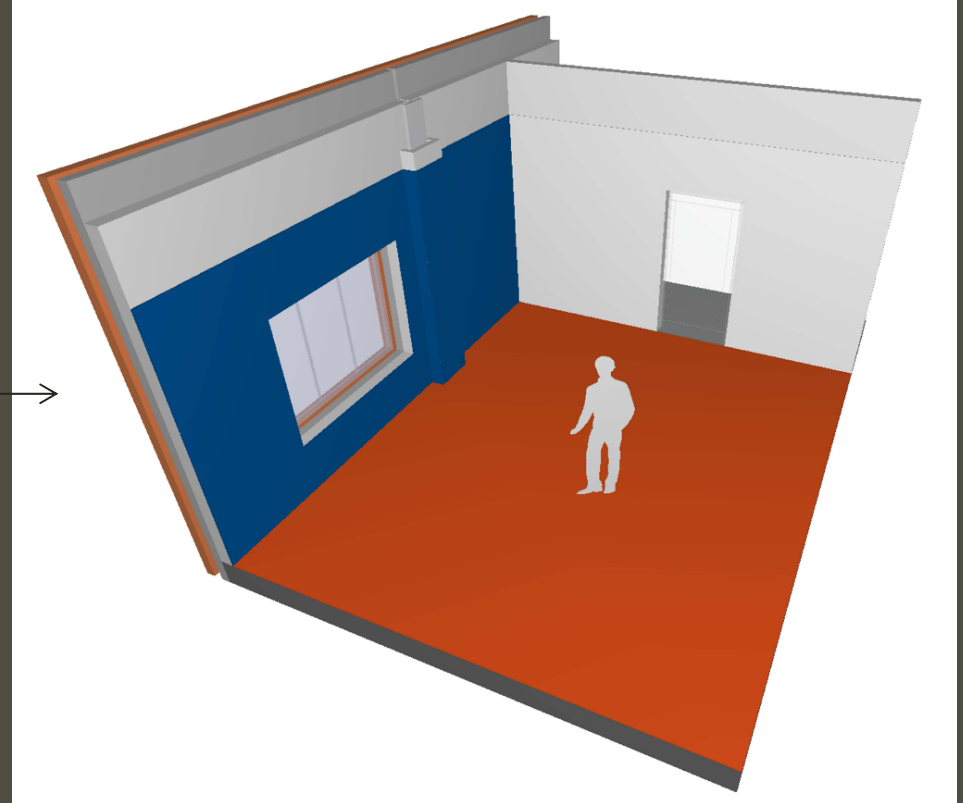
TECHNICALITIES



TECHNICALITIES



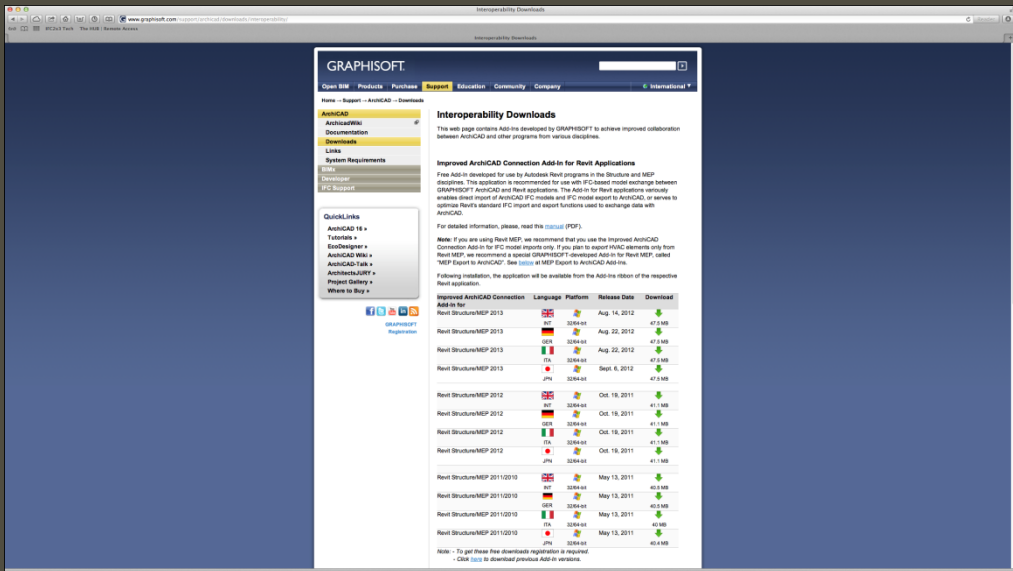
GRAPHISOFT ArchiCAD 16



Solibri Model Viewer



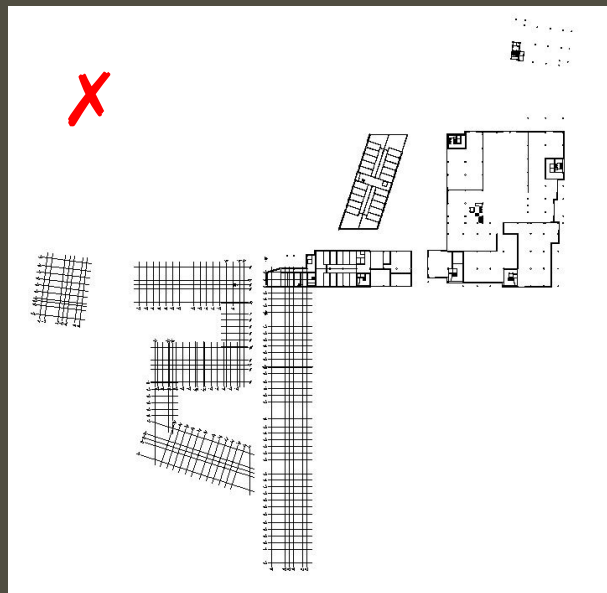
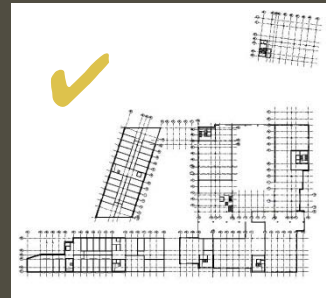
ARCHICAD TO REVIT



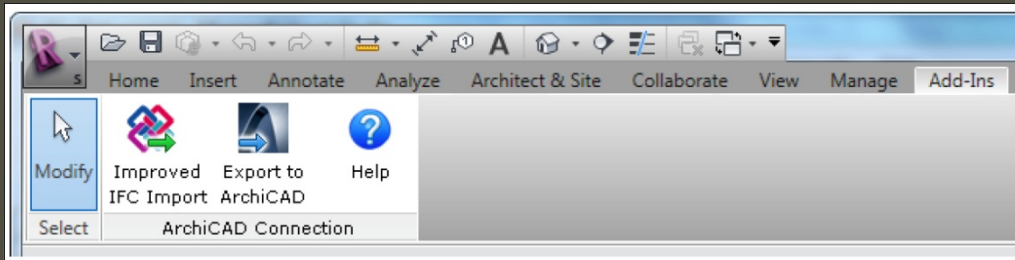
<http://www.graphisoft.com/support/archicad/downloads/interoperability/>

Add-in fixes –

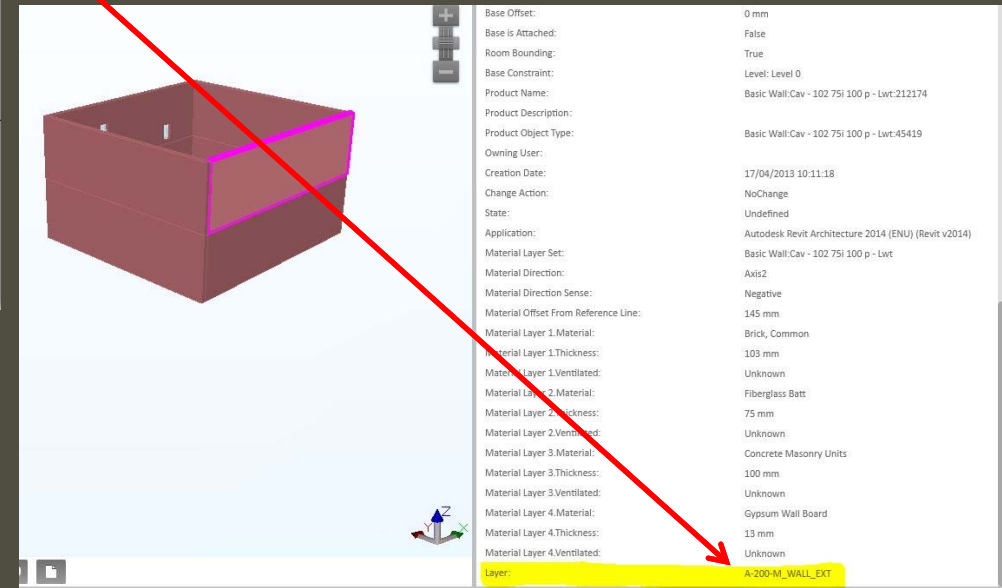
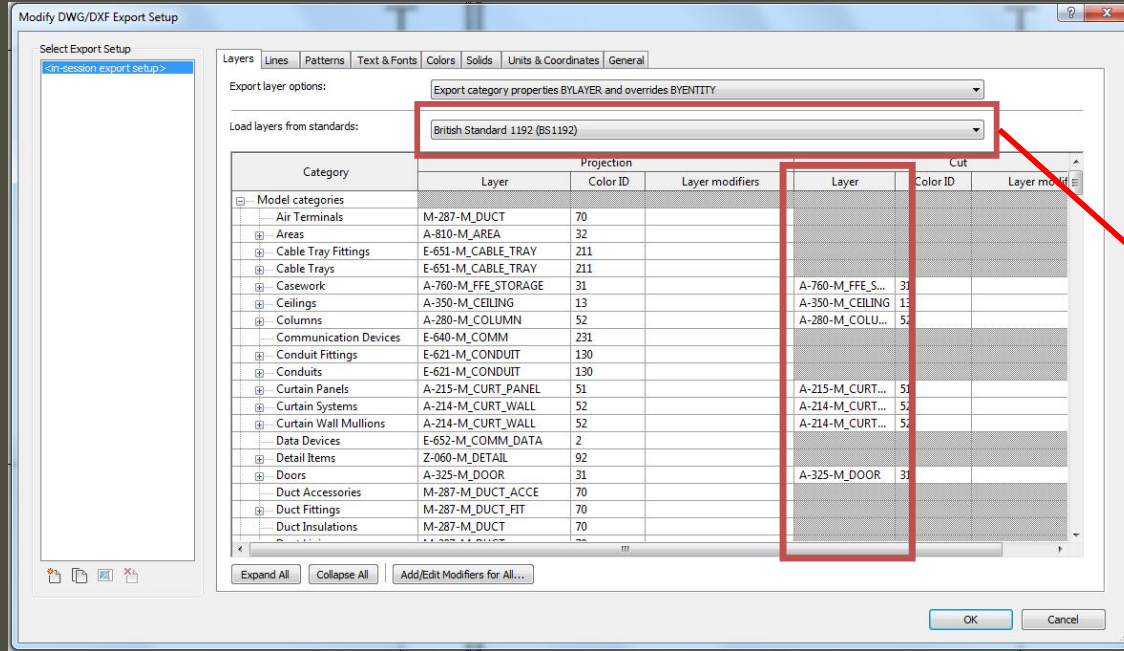
- IFC GUIDs
- Grids
- Load-bearing slabs
- Renovation status



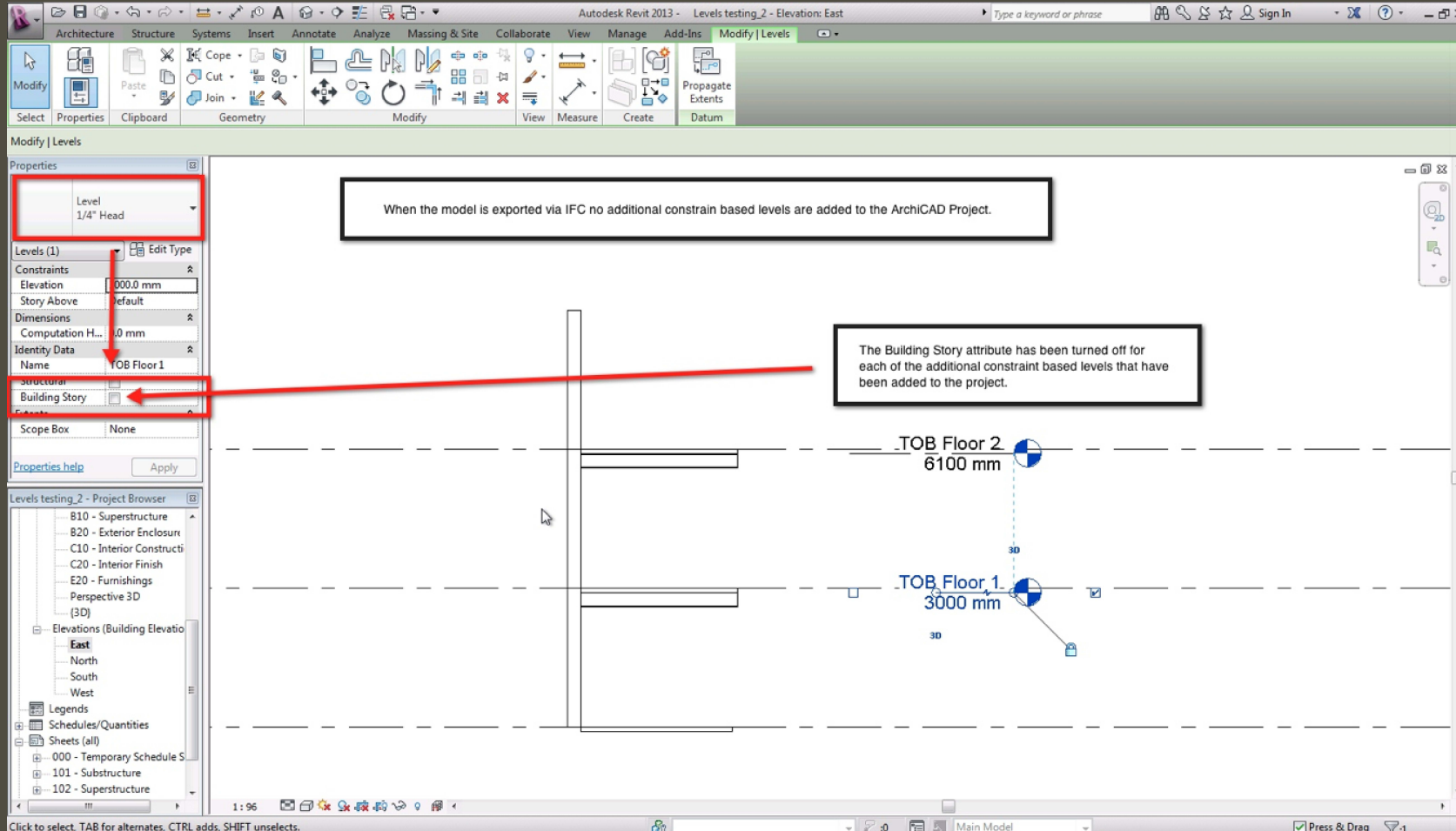
IFC THE GOOD THE BAD THE UGLY
#AU2013



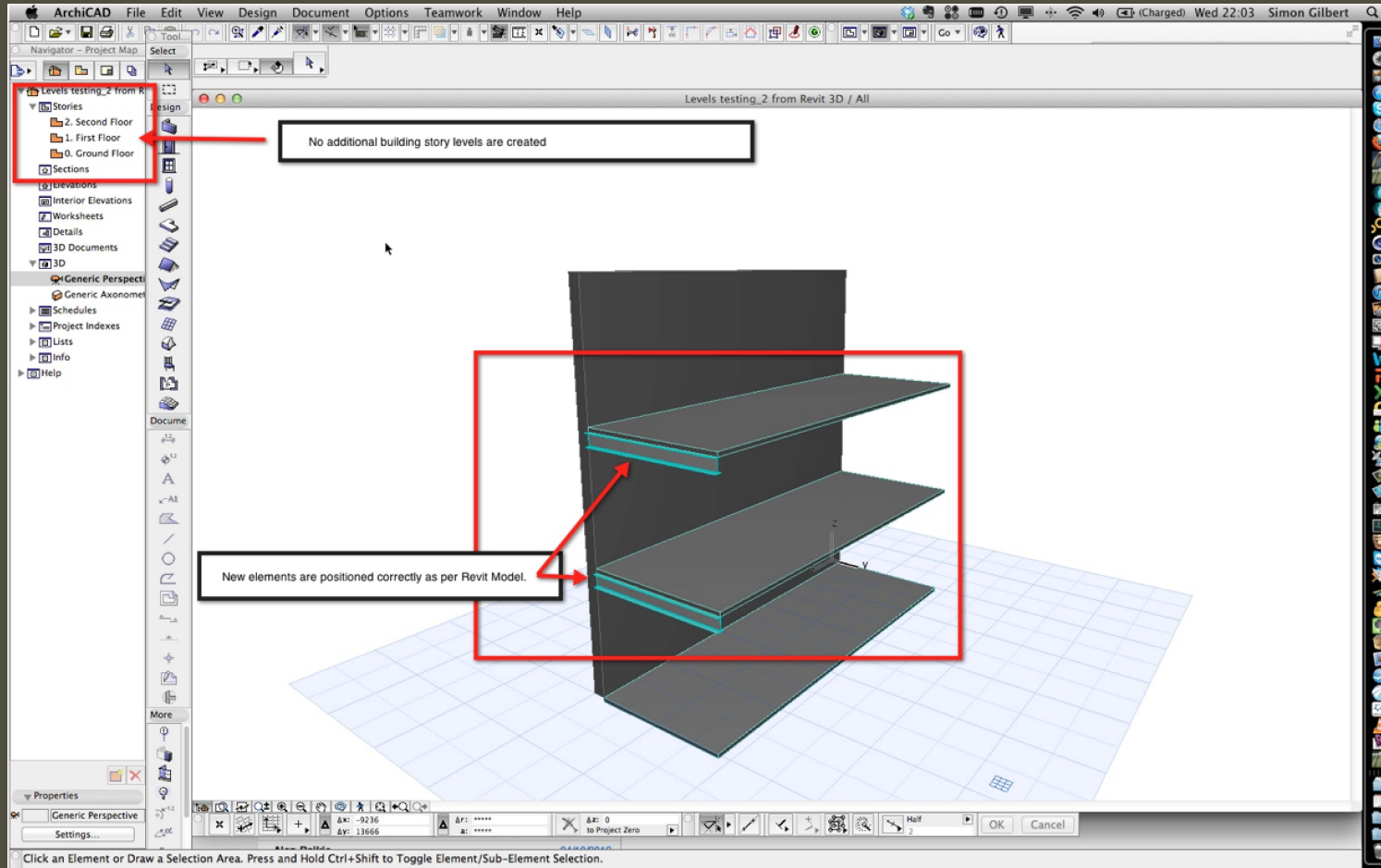
REVIT TO ARCHICAD - GENERAL



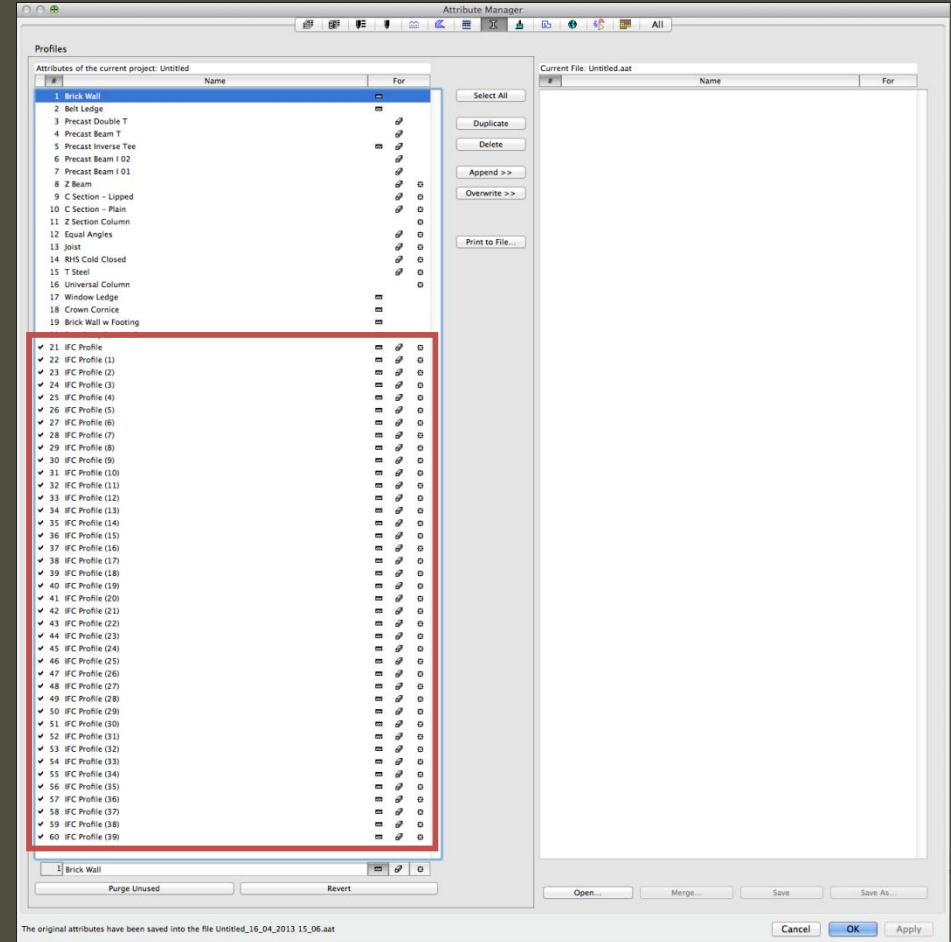
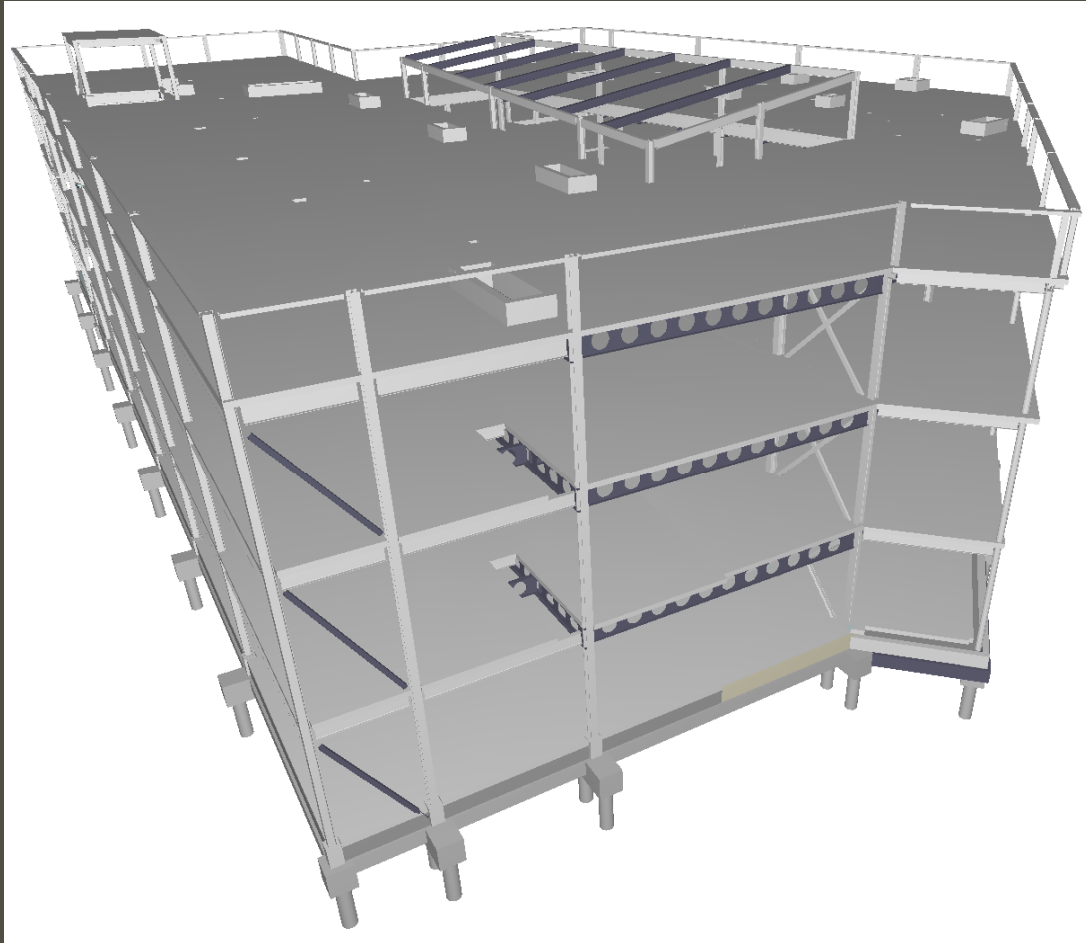
REVIT TO ARCHICAD - STRUCTURES



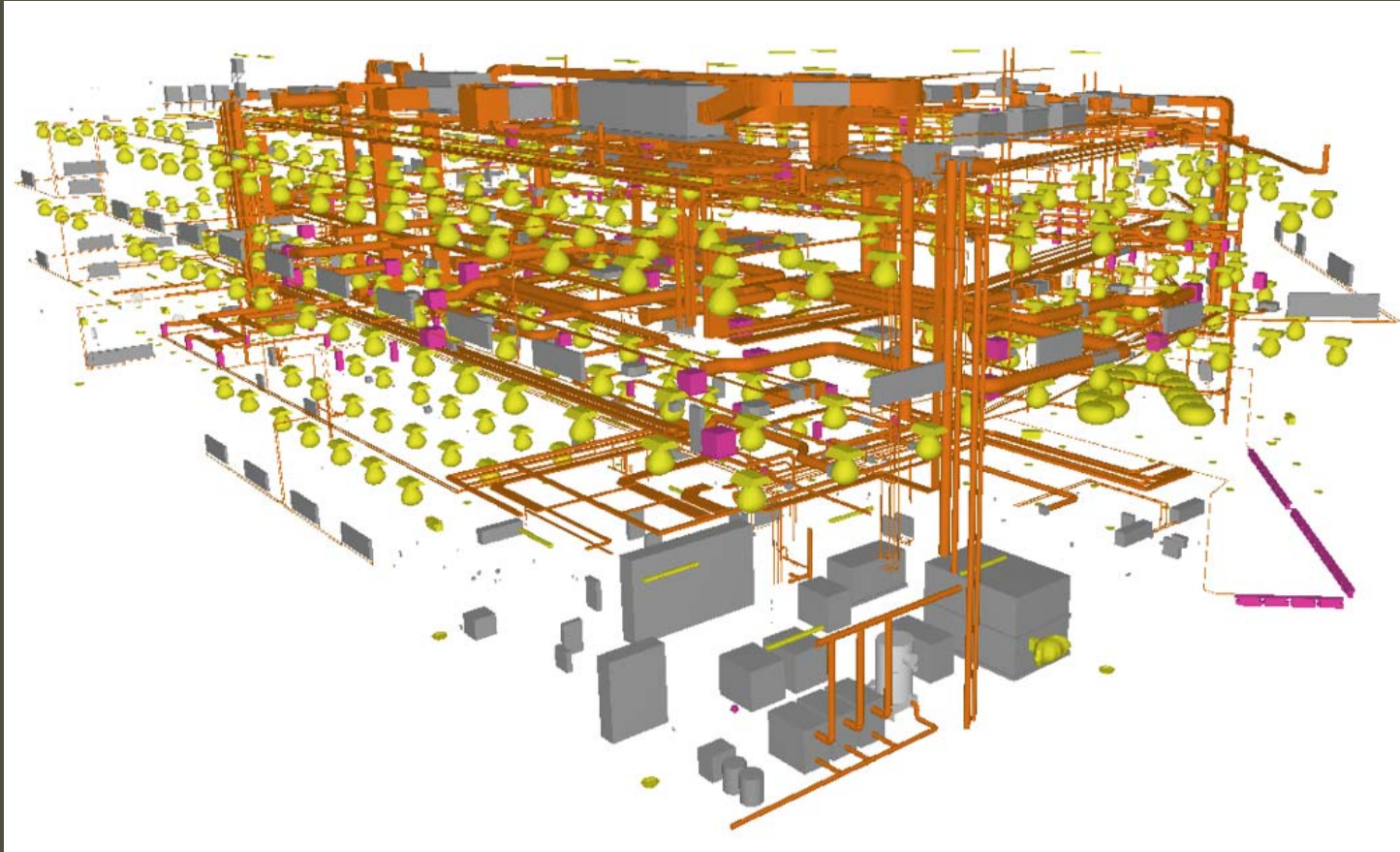
REVIT TO ARCHICAD - STRUCTURES



REVIT TO ARCHICAD - STRUCTURES



REVIT TO ARCHICAD - MEP



IFC from Autodesk REVIT 2013



AUTODESK UNIVERSITY 2013



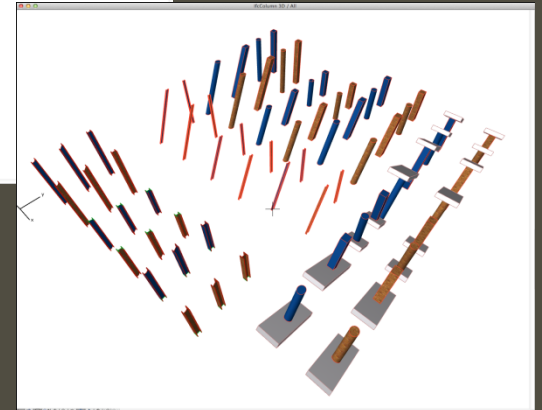
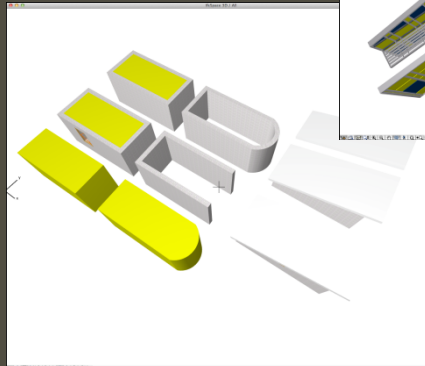
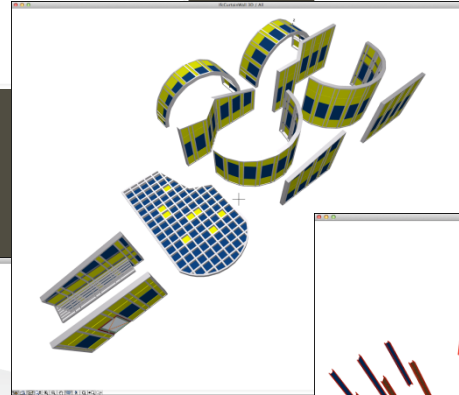
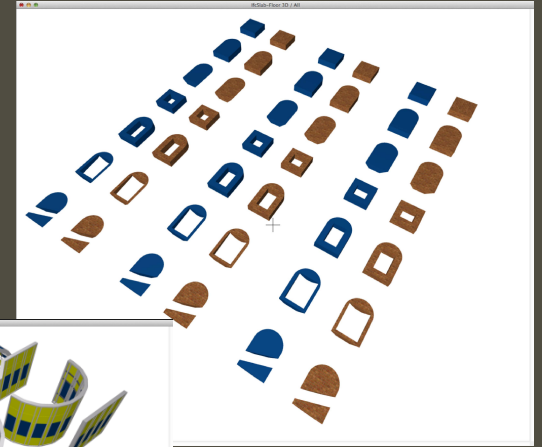
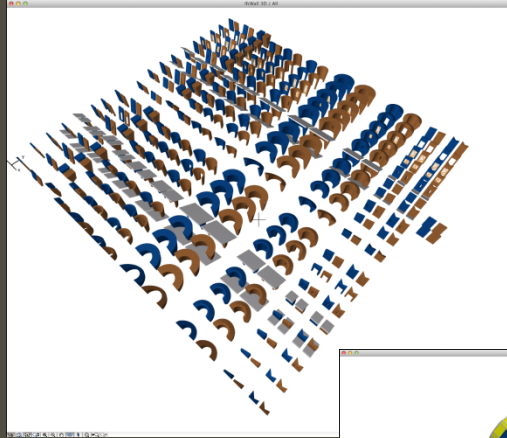
BUCKINGHAMSHIRE
University
Technical
College



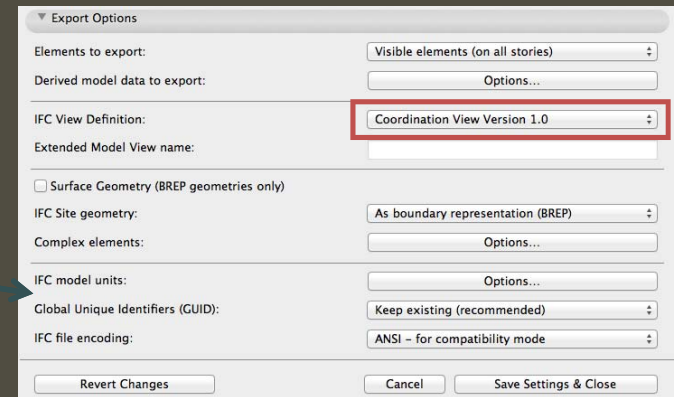
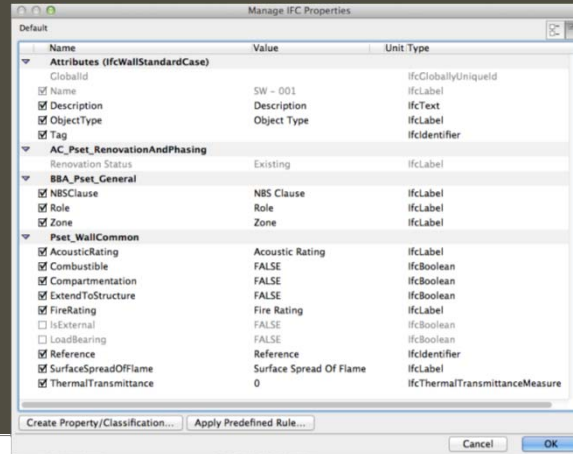
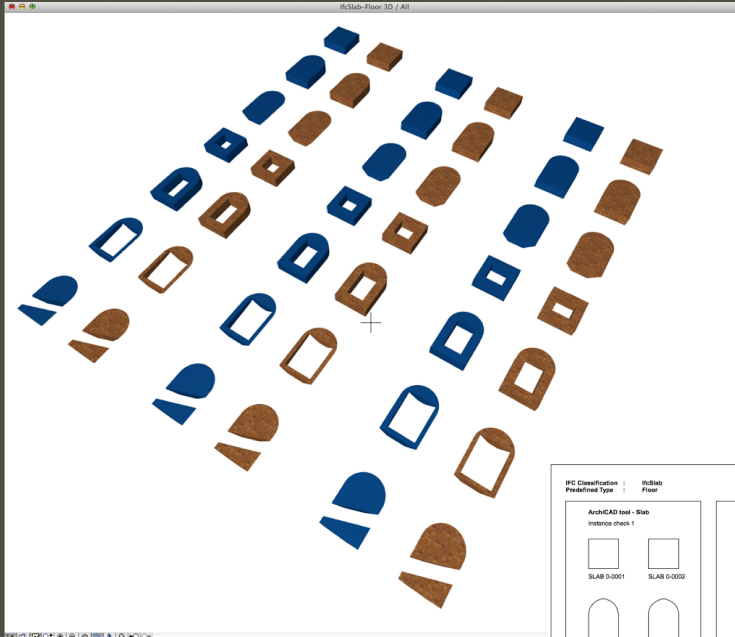
IFC THE GOOD THE BAD THE UGLY
#AU2013

TESTING – GOOD, BAD OR UGLY?

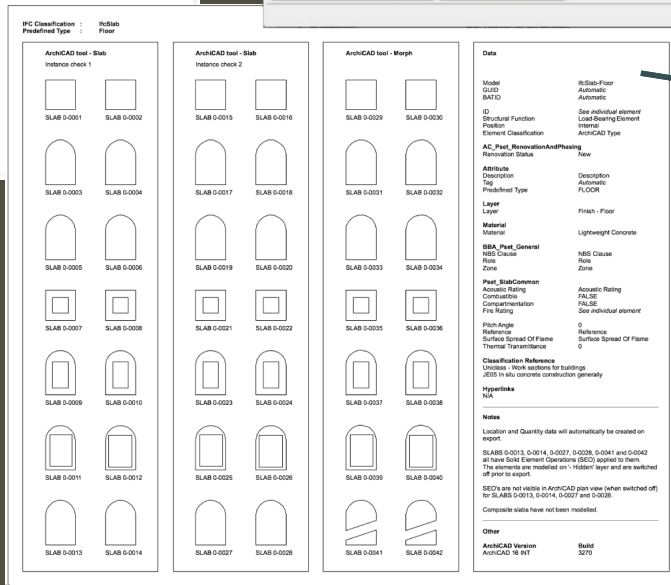
- What we have tested to date
 - Columns (70)
 - Curtain Walls (11)
 - Slabs (42) – includes ceilings, floor finishes and flat roofs
 - Spaces (11)
 - Walls (364) - includes some opening types
- Total – 498 elements x 3 translators x 6 software solutions x 39 lines of data



TESTING – GOOD, BAD OR UGLY?



Graphisoft ArchiCAD 16



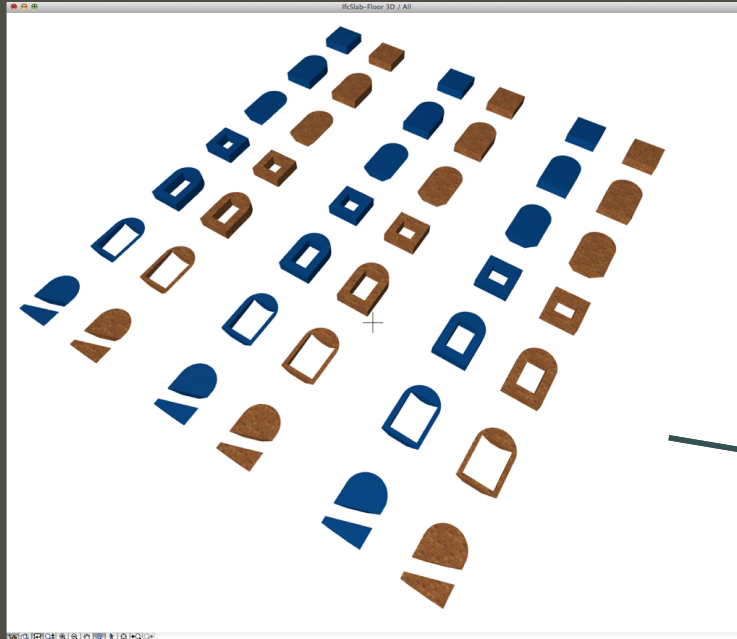
Translator



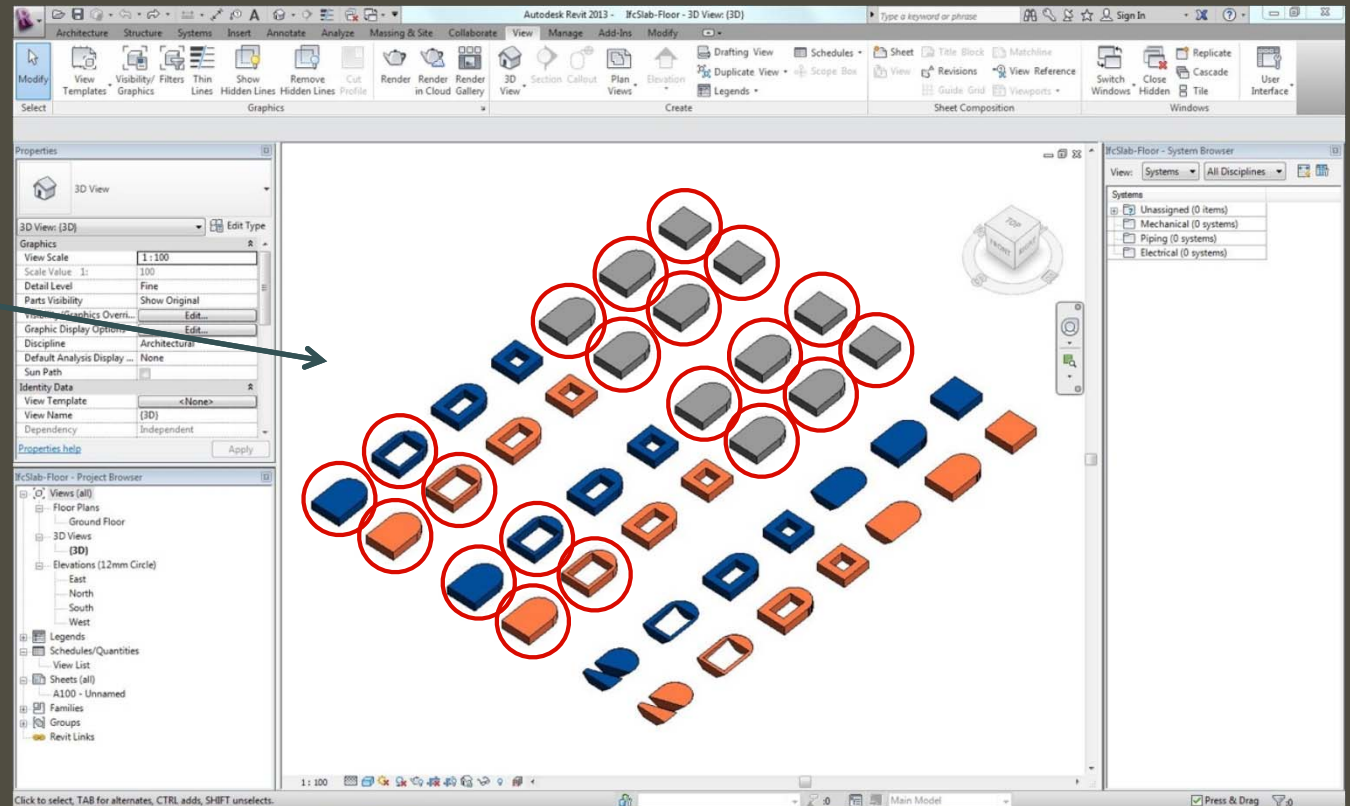
AUTODESK UNIVERSITY 2013

IFC THE GOOD THE BAD THE UGLY
#AU2013

TESTING – GOOD, BAD OR UGLY?



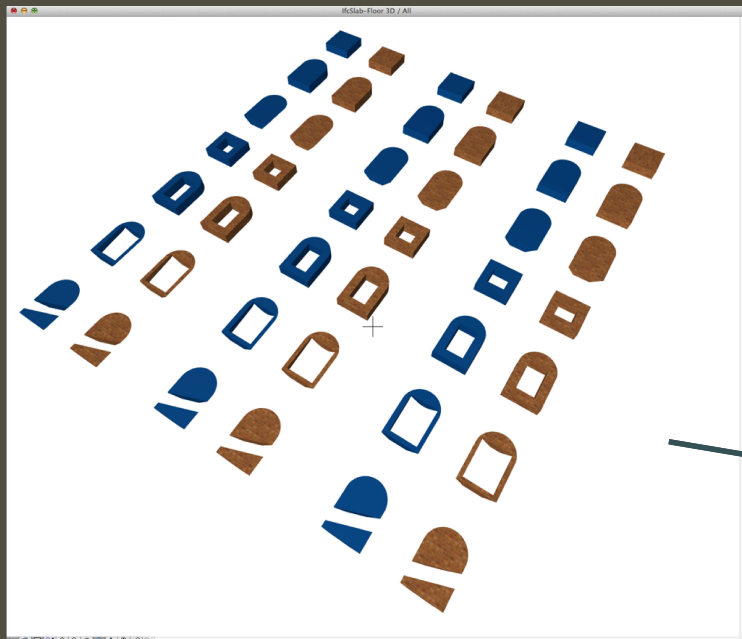
Graphisoft ArchiCAD 16



Autodesk Revit 2013

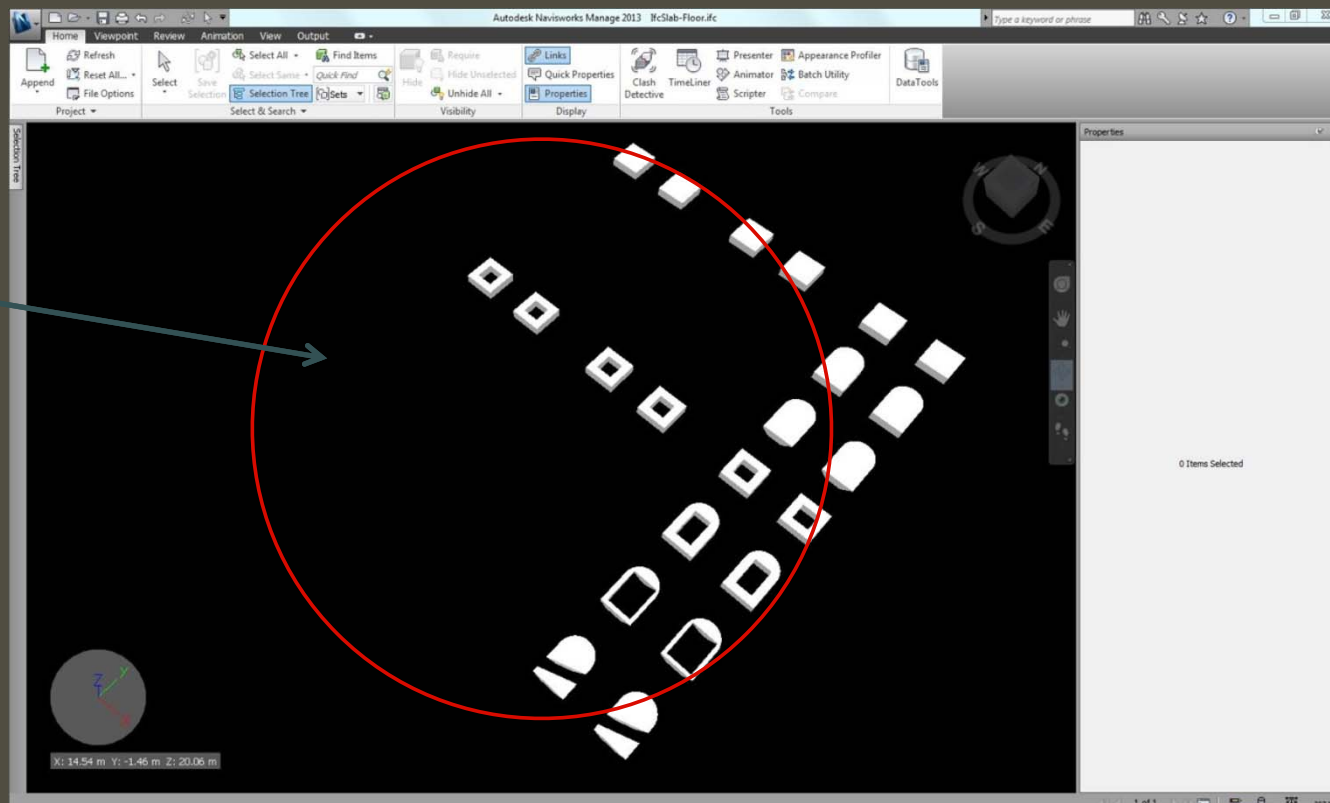


THE BAD



Graphisoft ArchiCAD 16

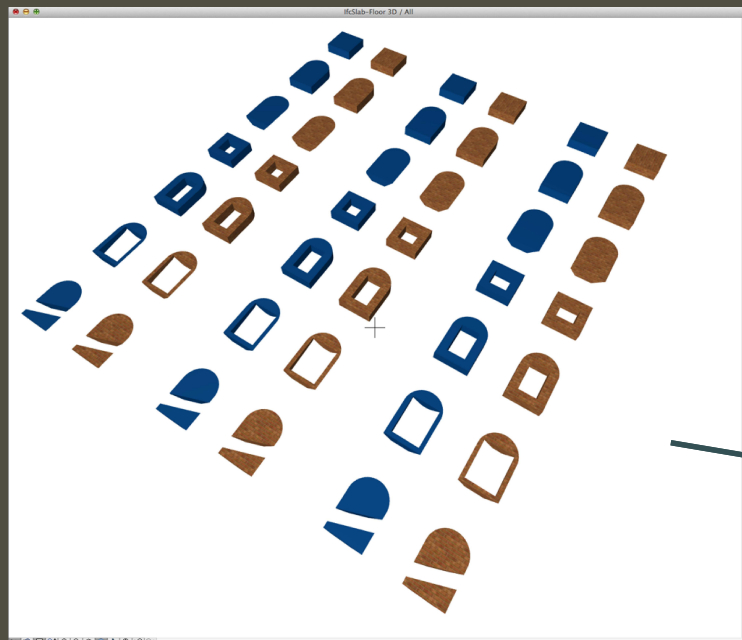
Autodesk Navisworks 2013



AUTODESK UNIVERSITY 2013

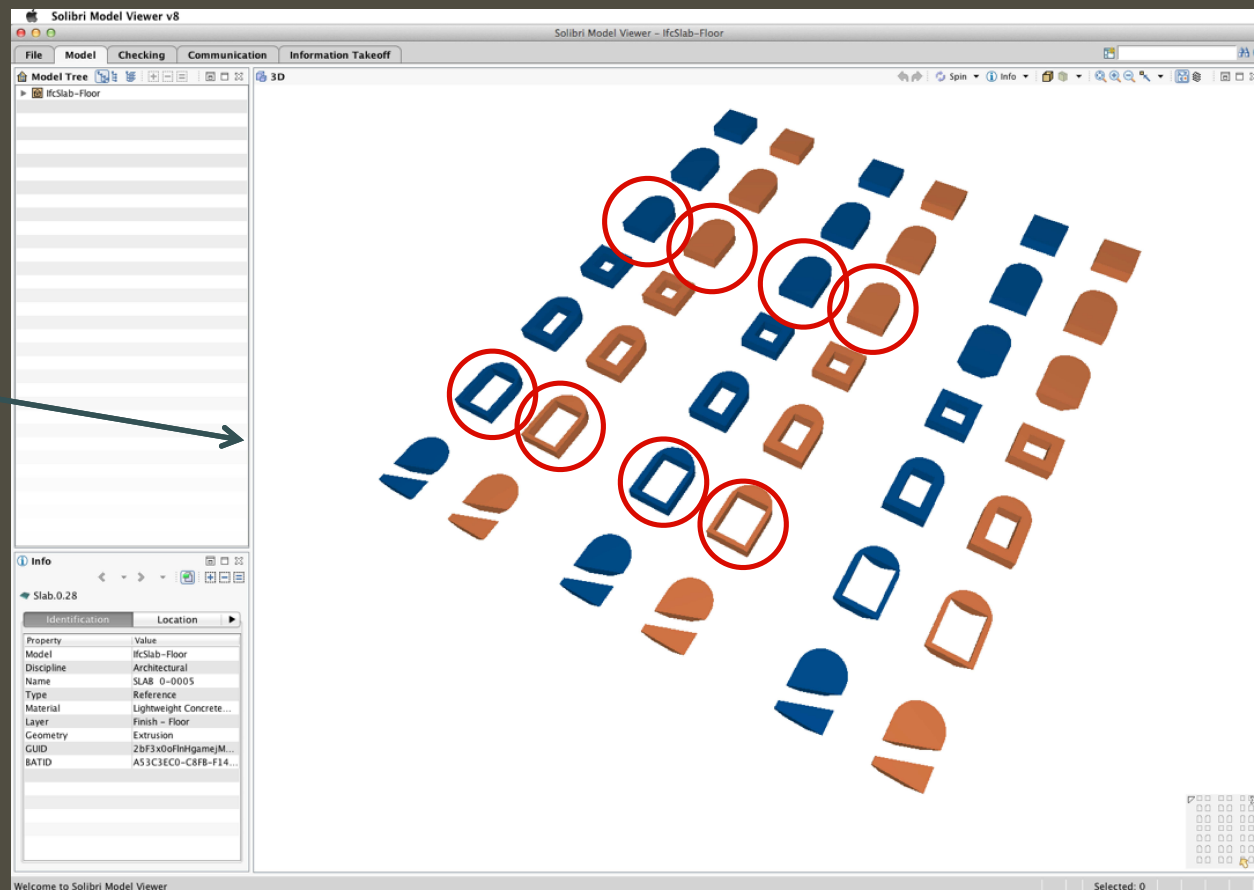
IFC THE GOOD THE BAD THE UGLY
#AU2013

THE BAD

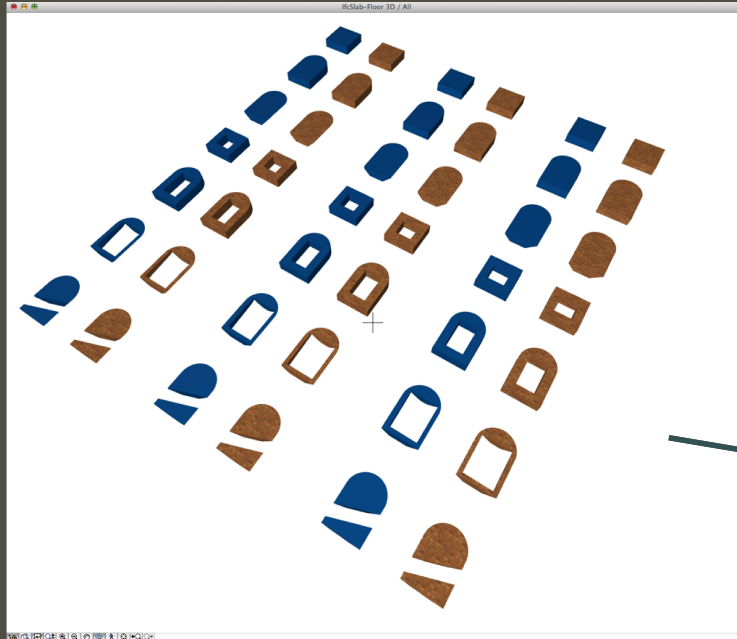


Graphisoft ArchiCAD 16

Solibri Model Viewer v8



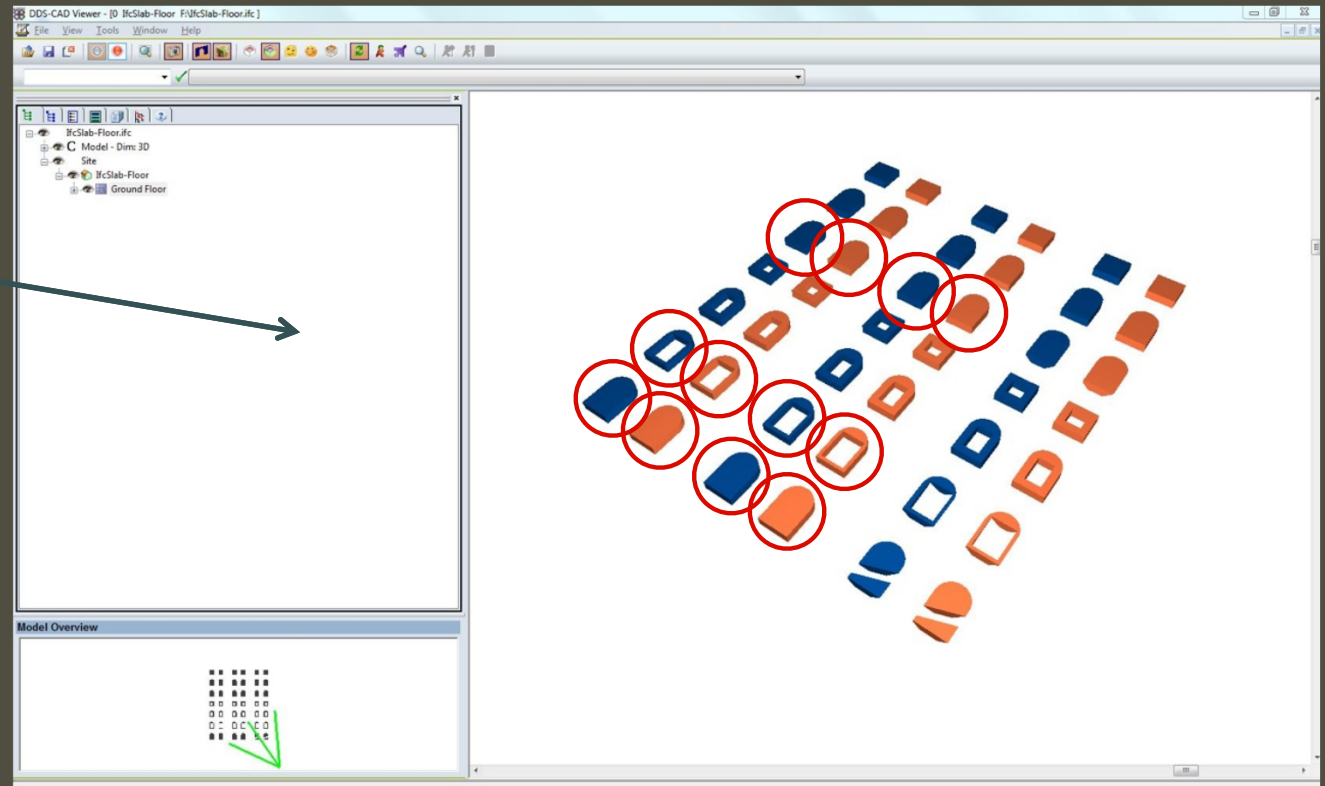
THE BAD



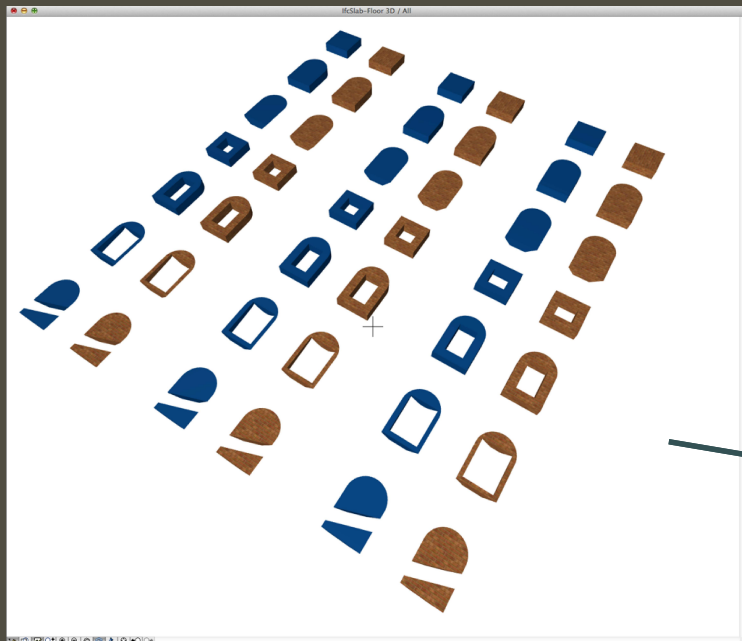
Graphisoft ArchiCAD 16



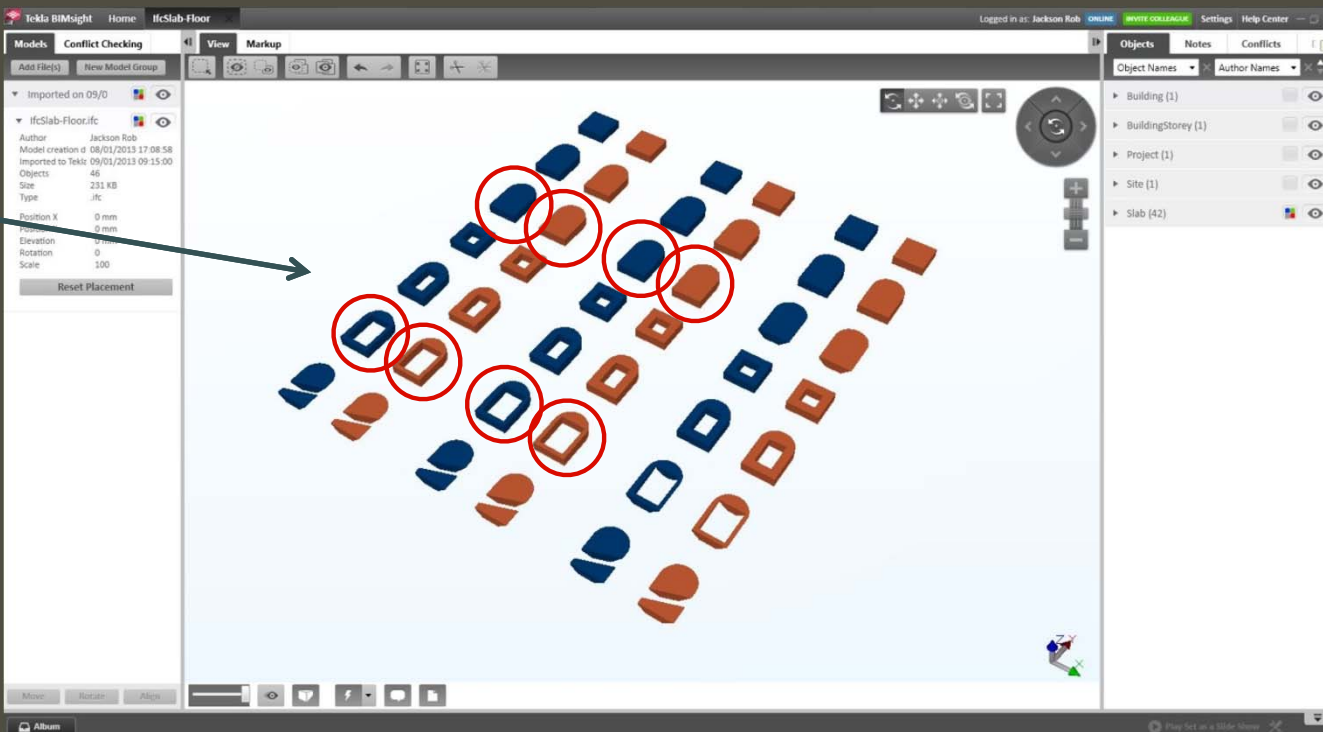
DDS-CAD Viewer



THE BAD

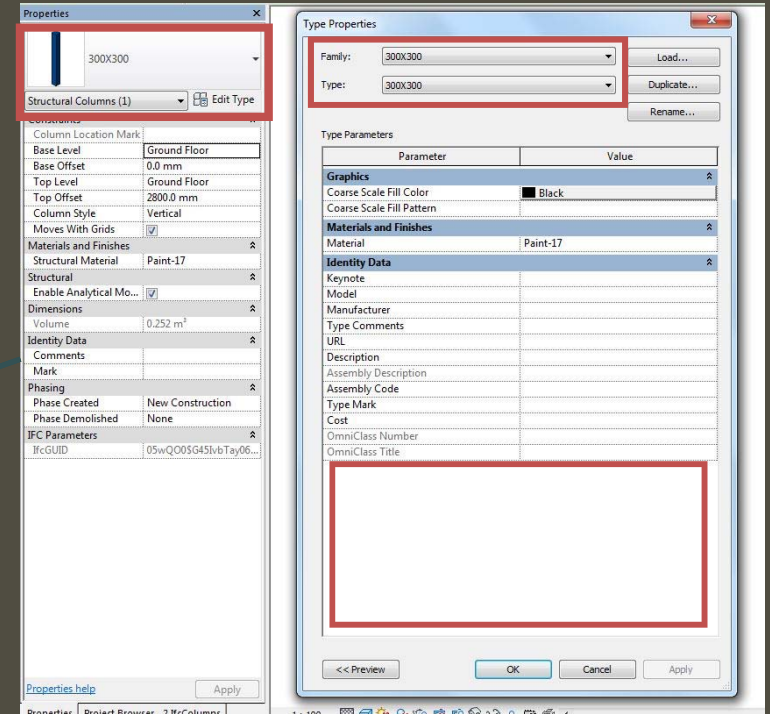
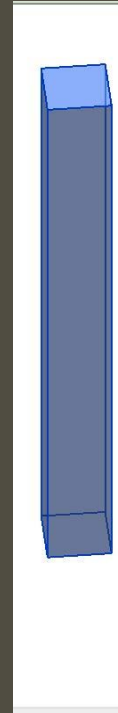
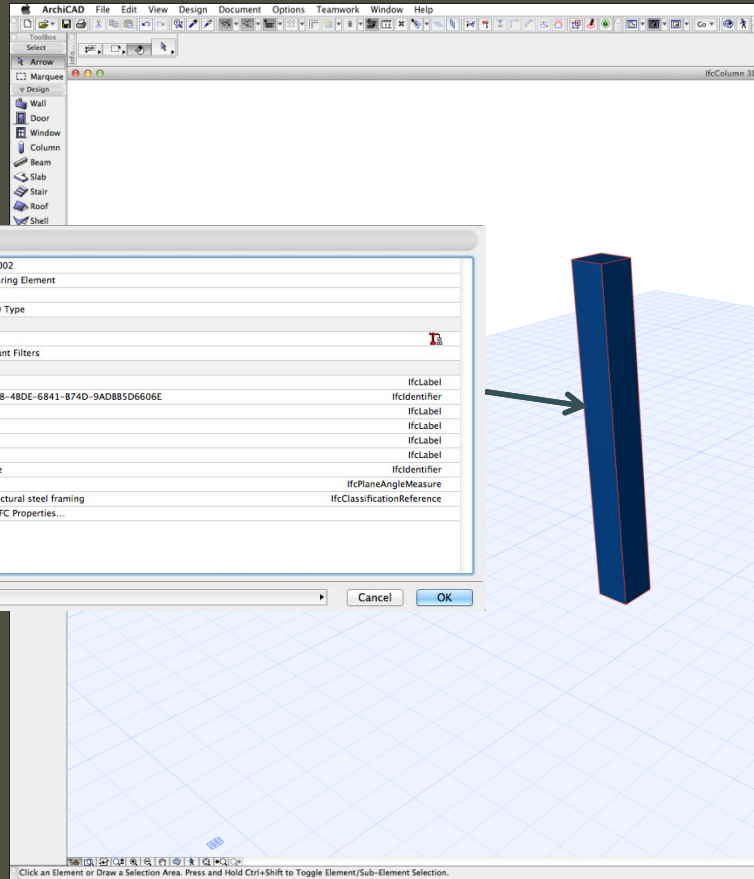


Graphisoft ArchiCAD 16



THE UGLY

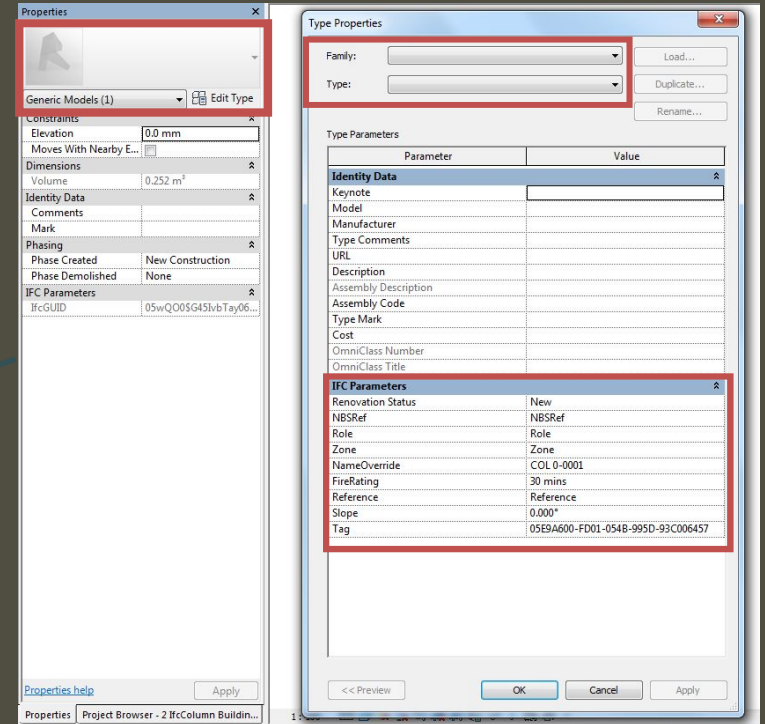
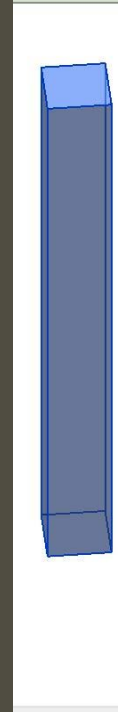
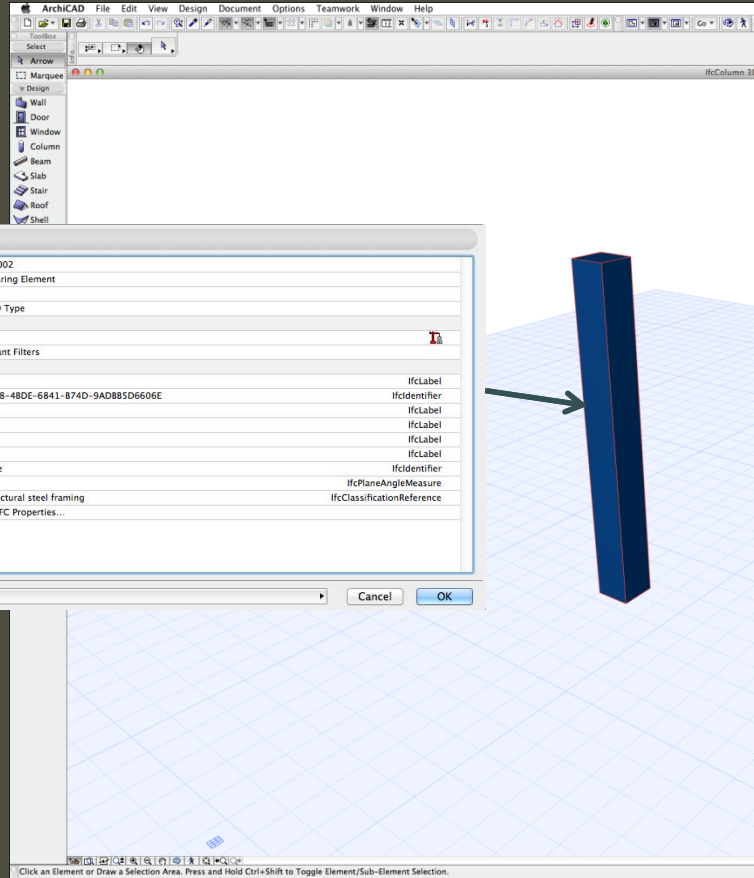
Columns (and beams)



Autodesk REVIT 2014

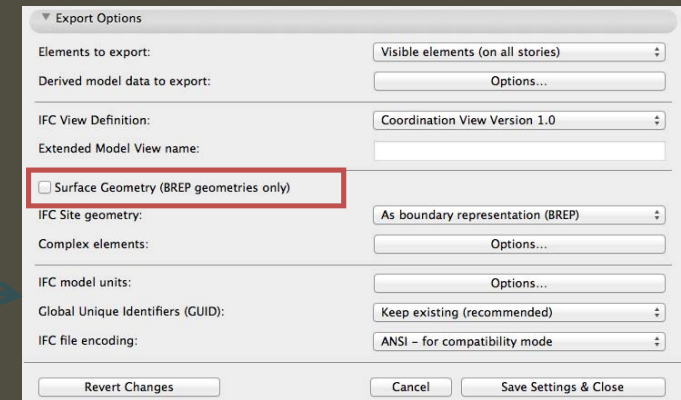
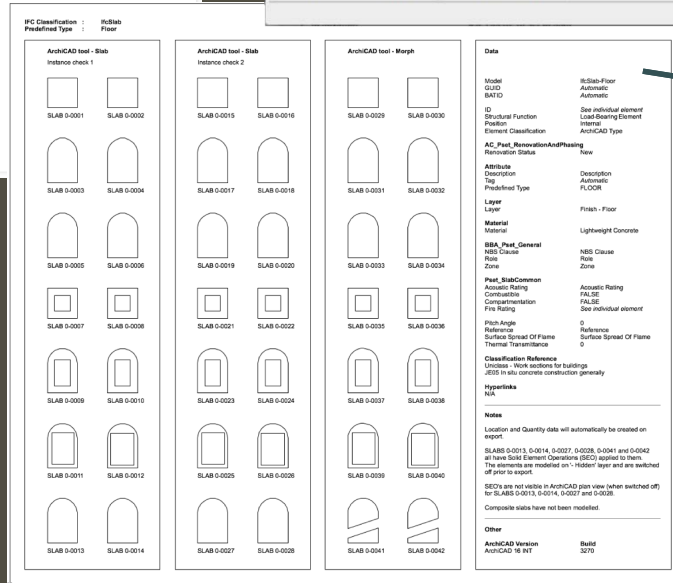
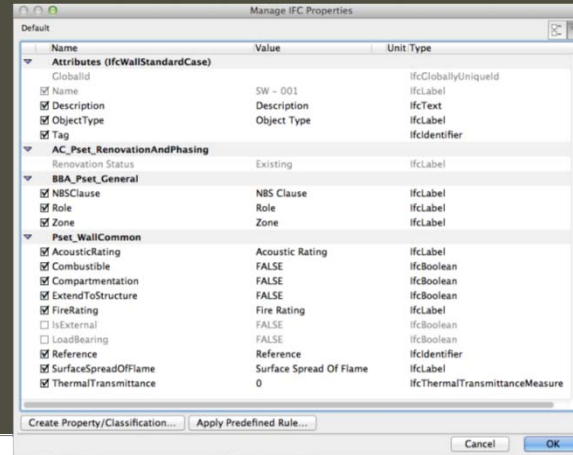
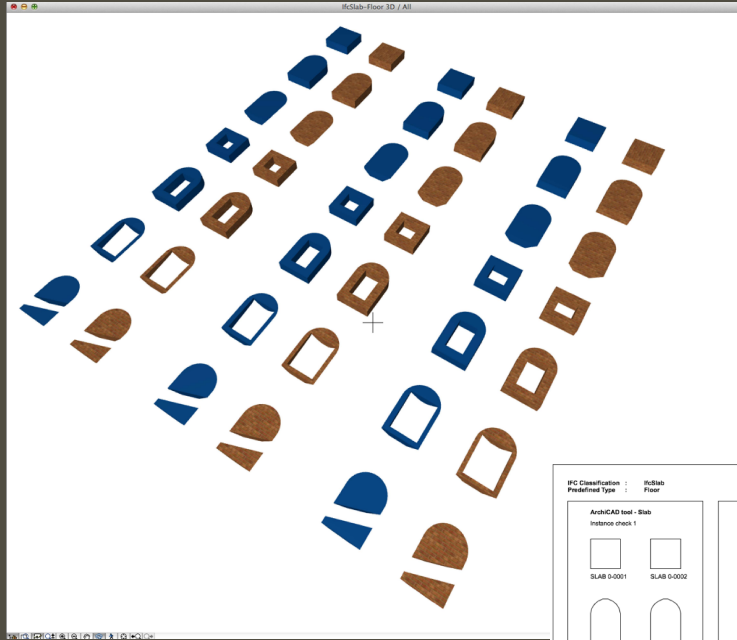
THE GOOD

Columns (and beams)



Autodesk REVIT 2014

TESTING – GOOD, BAD OR UGLY?



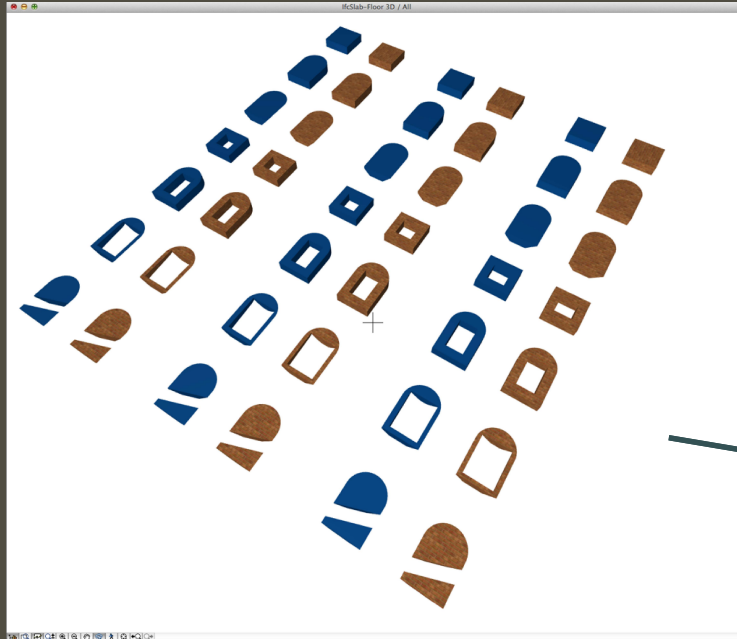
Translator



AUTODESK UNIVERSITY 2013

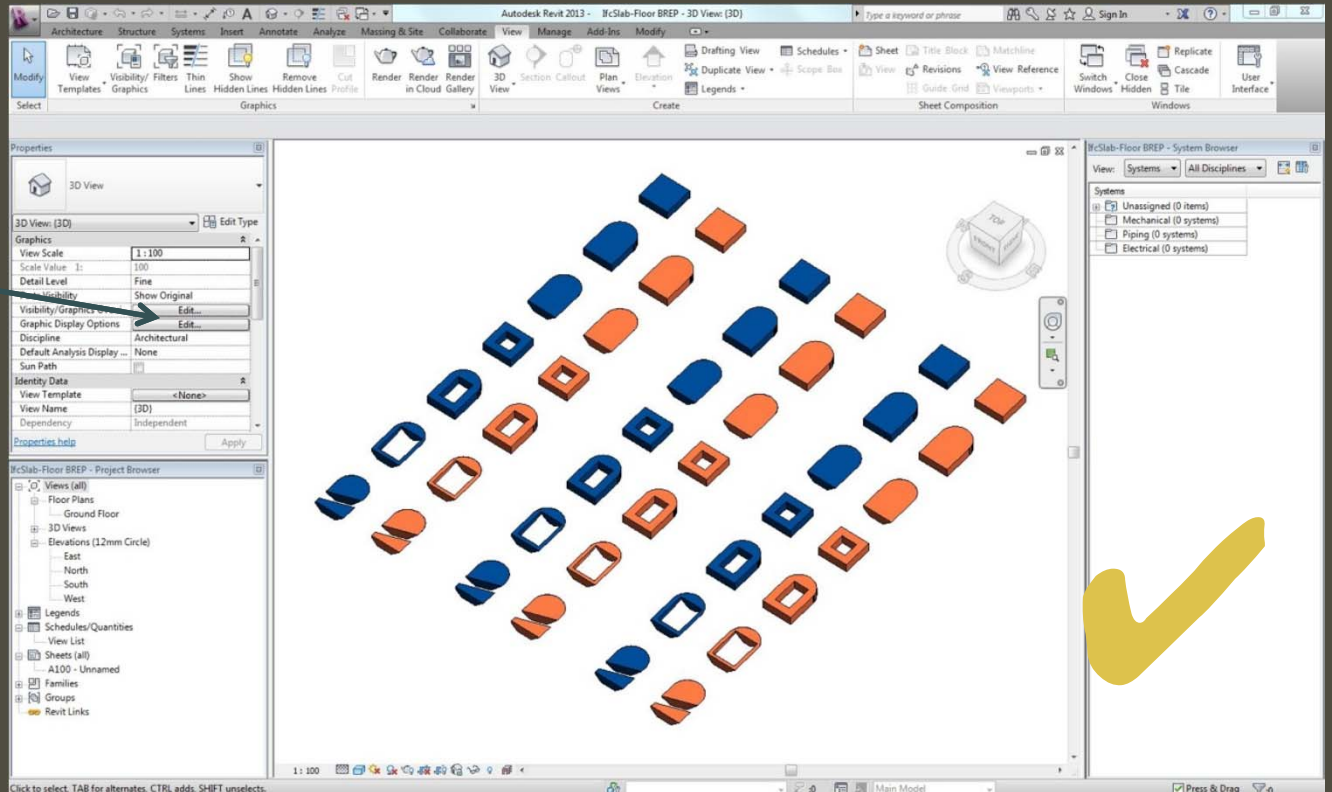
IFC THE GOOD THE BAD THE UGLY
#AU2013

THE GOOD



Graphisoft ArchiCAD 16

Autodesk Revit 2013

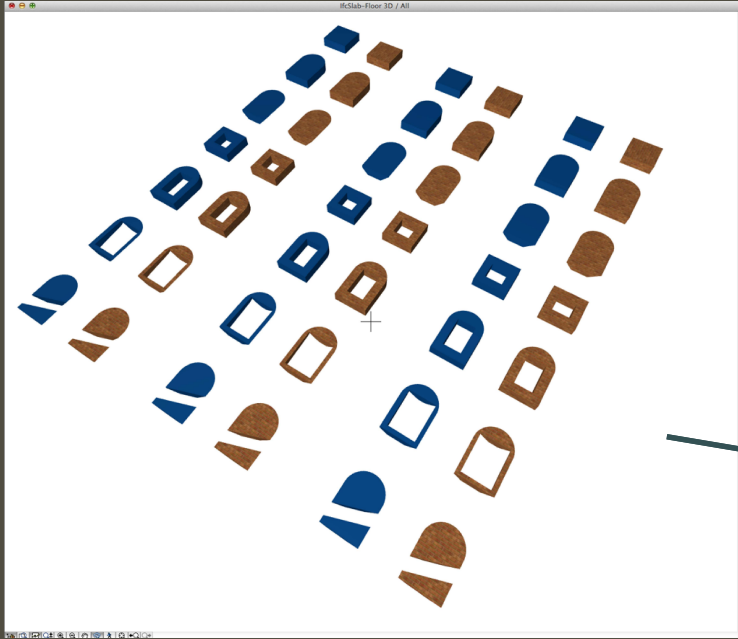


AUTODESK UNIVERSITY 2013

IFC THE GOOD THE BAD THE UGLY

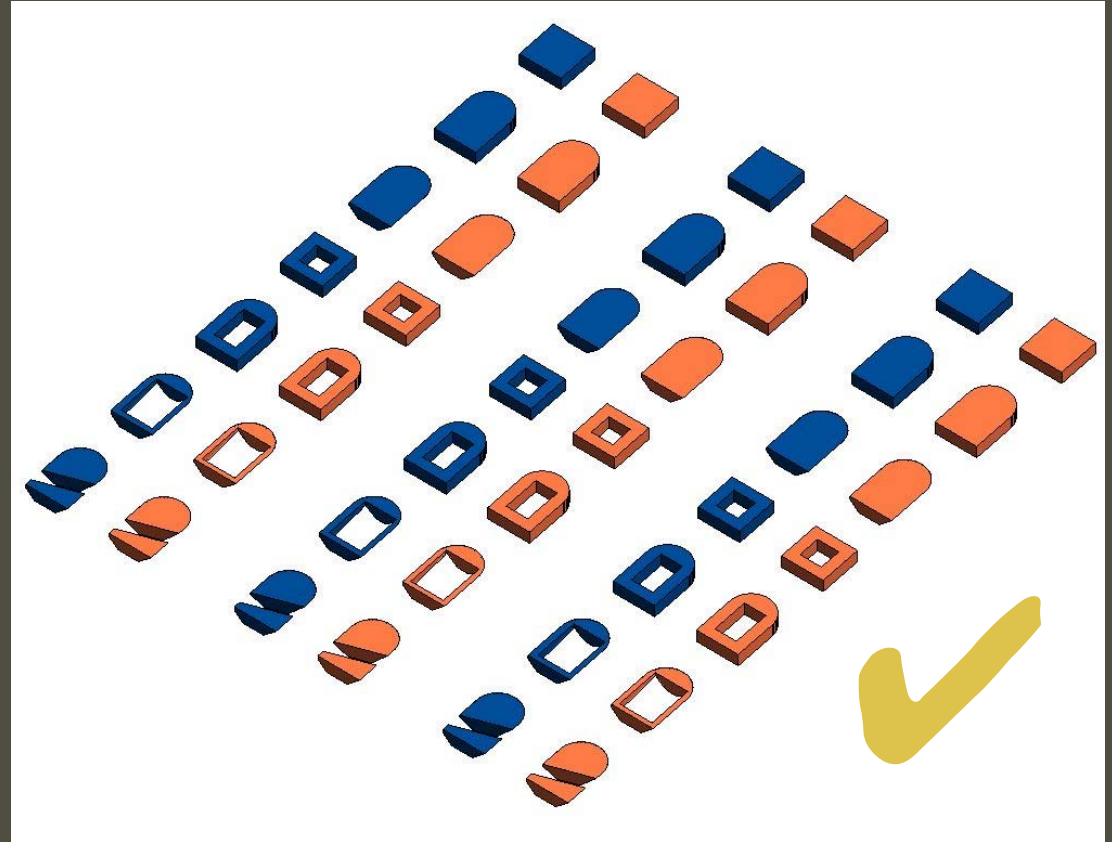
#AU2013

THE GOOD



Graphisoft ArchiCAD 16

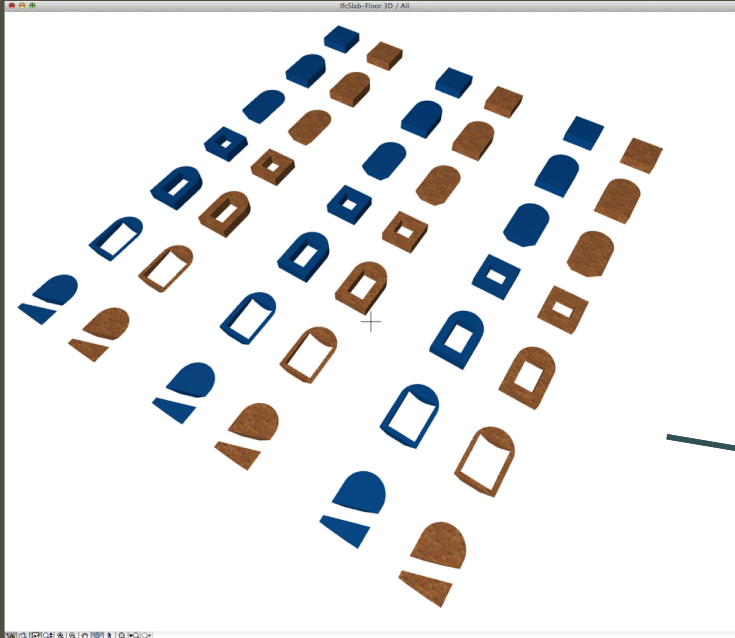
Autodesk Revit 2014



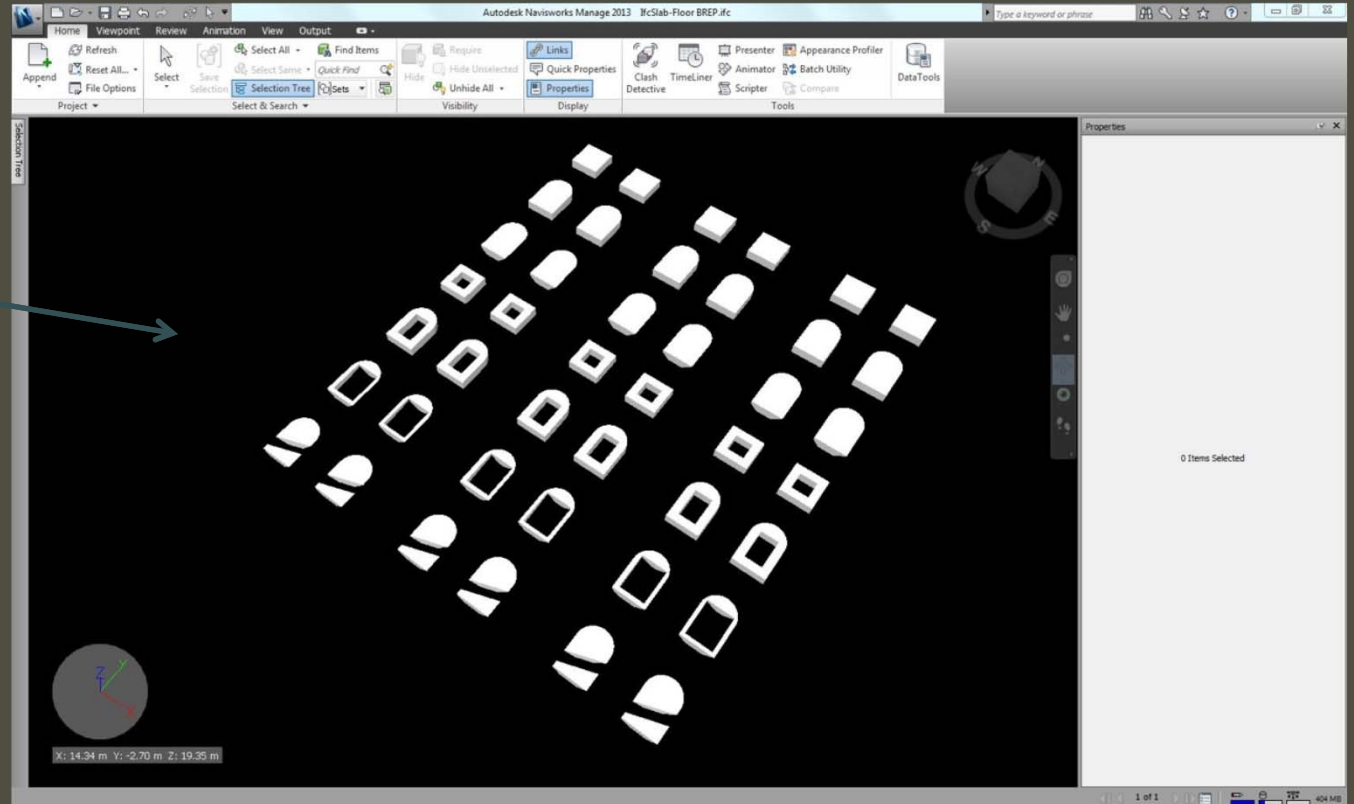
AUTODESK UNIVERSITY 2013

IFC THE GOOD THE BAD THE UGLY
#AU2013

THE GOOD (ALMOST)



Graphisoft ArchiCAD 16



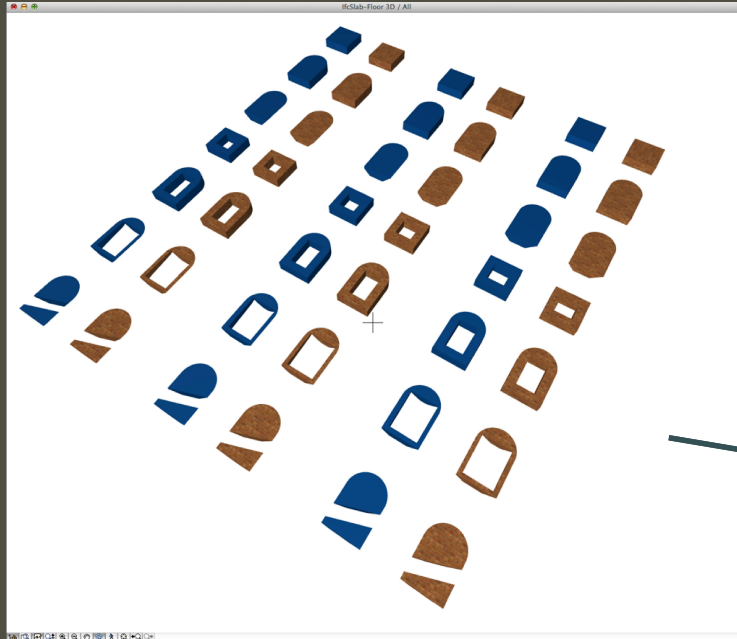
Autodesk Navisworks 2013



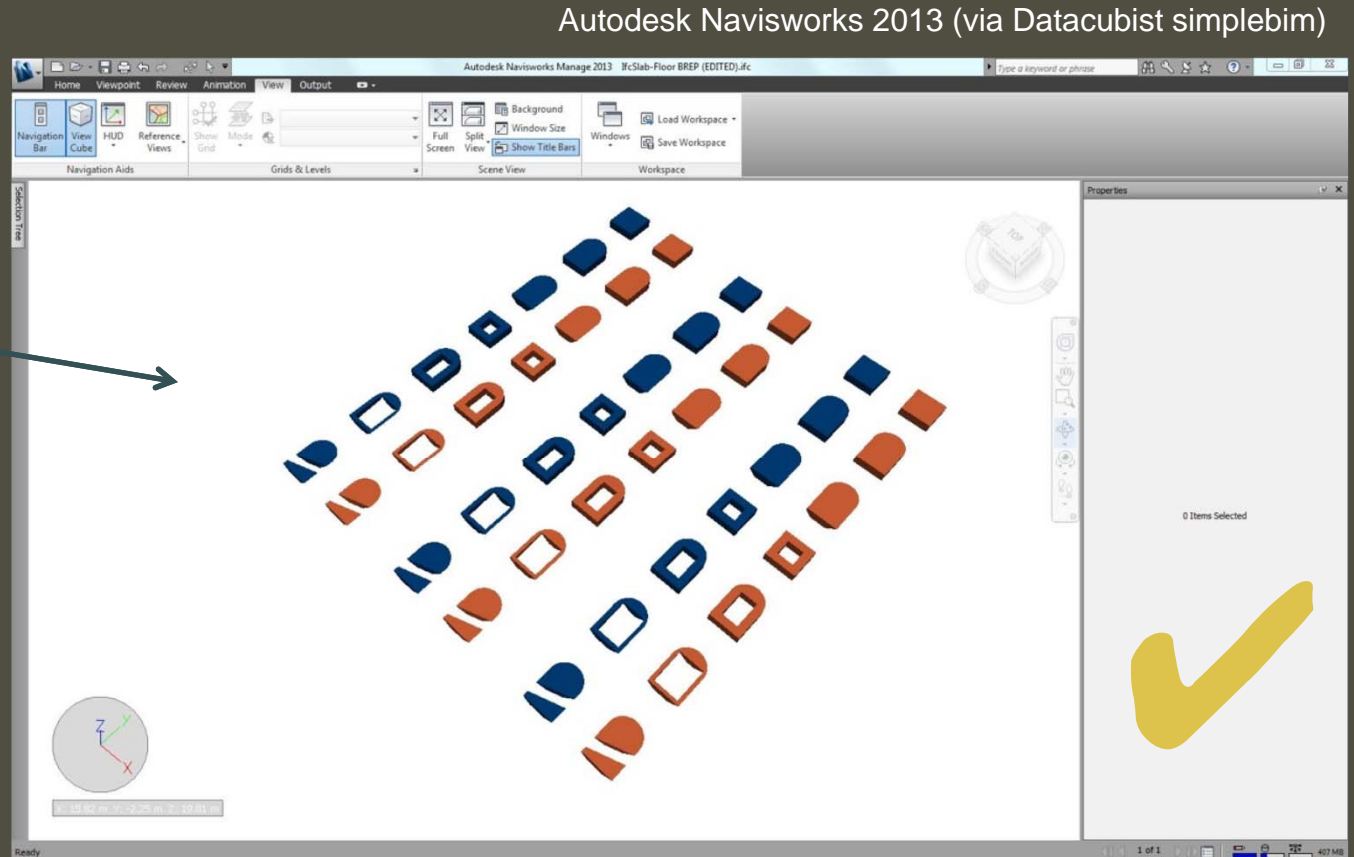
AUTODESK UNIVERSITY 2013

IFC THE GOOD THE BAD THE UGLY
#AU2013

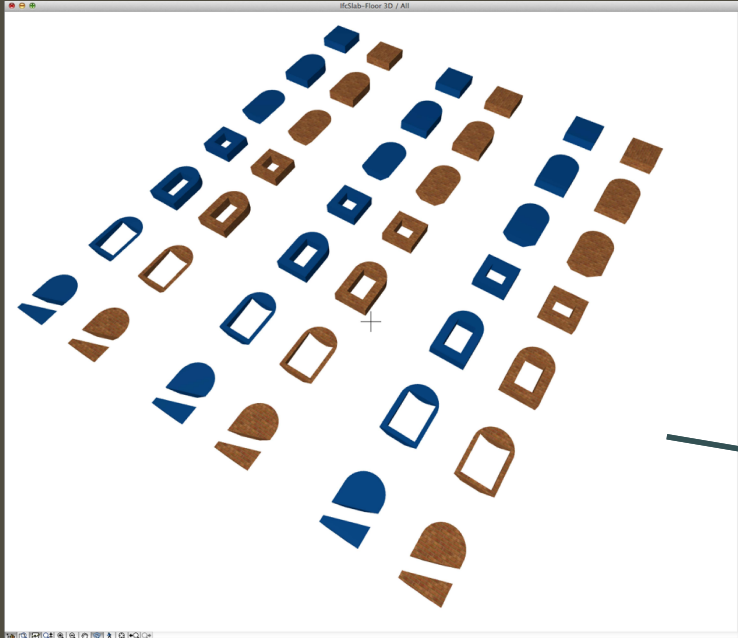
THE GOOD



Graphisoft ArchiCAD 16

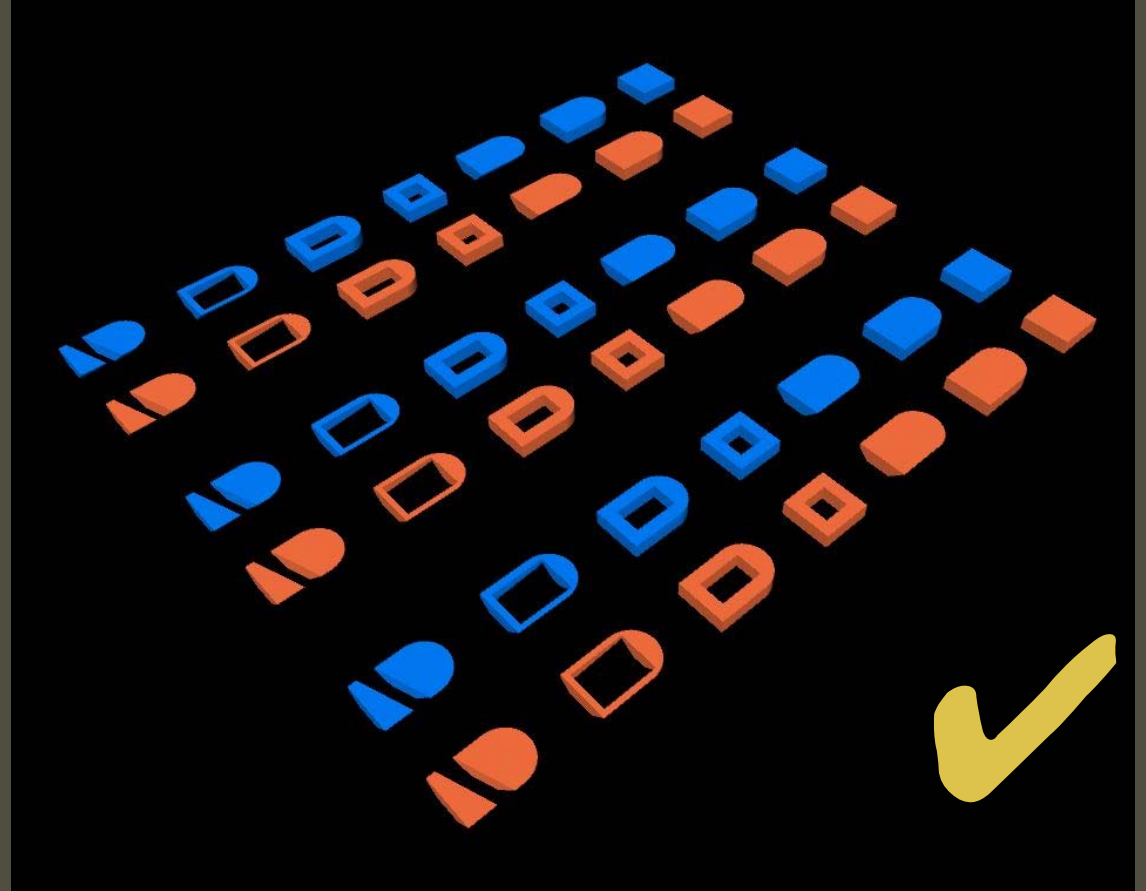


THE GOOD



Graphisoft ArchiCAD 16

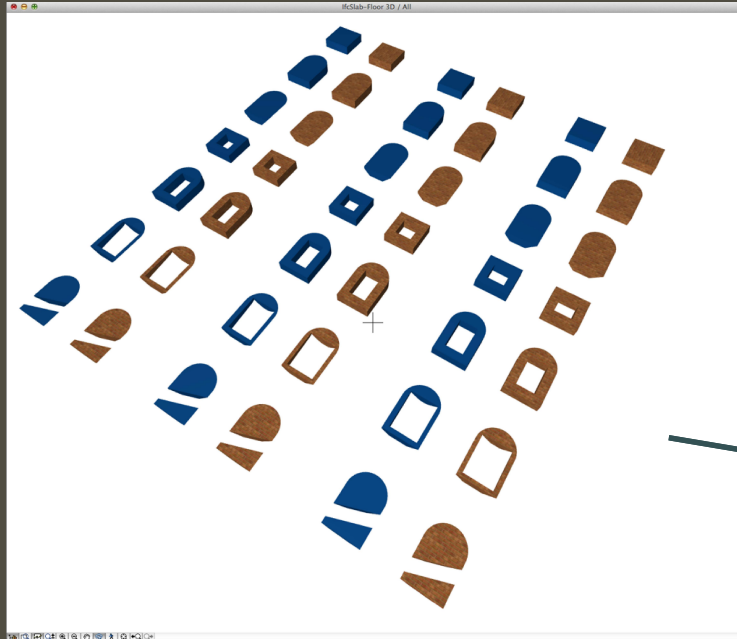
Autodesk Navisworks 2014



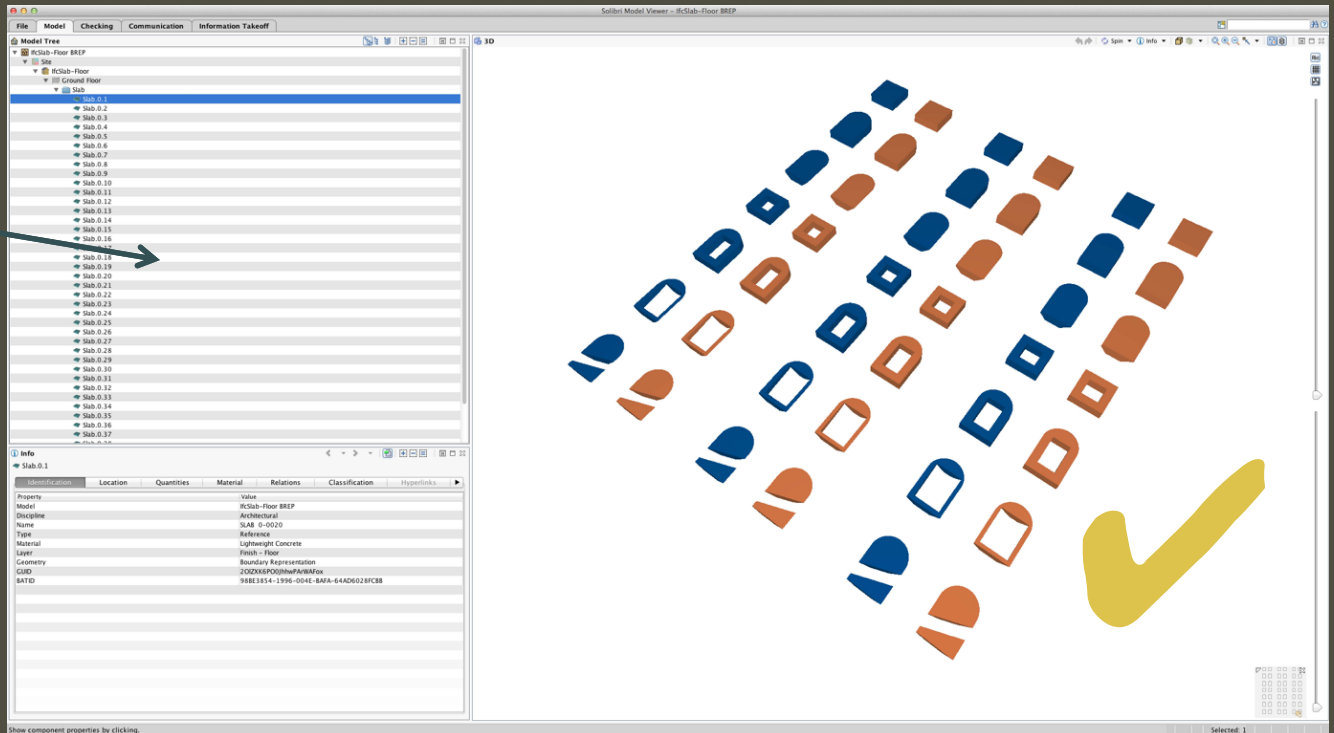
AUTODESK UNIVERSITY 2013

IFC THE GOOD THE BAD THE UGLY
#AU2013

THE GOOD



Graphisoft ArchiCAD 16



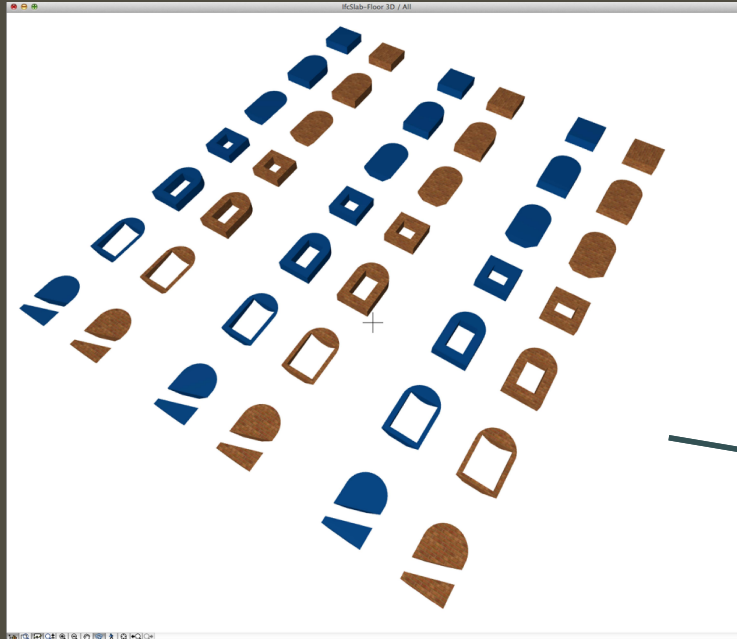
Solibri Model Viewer v8



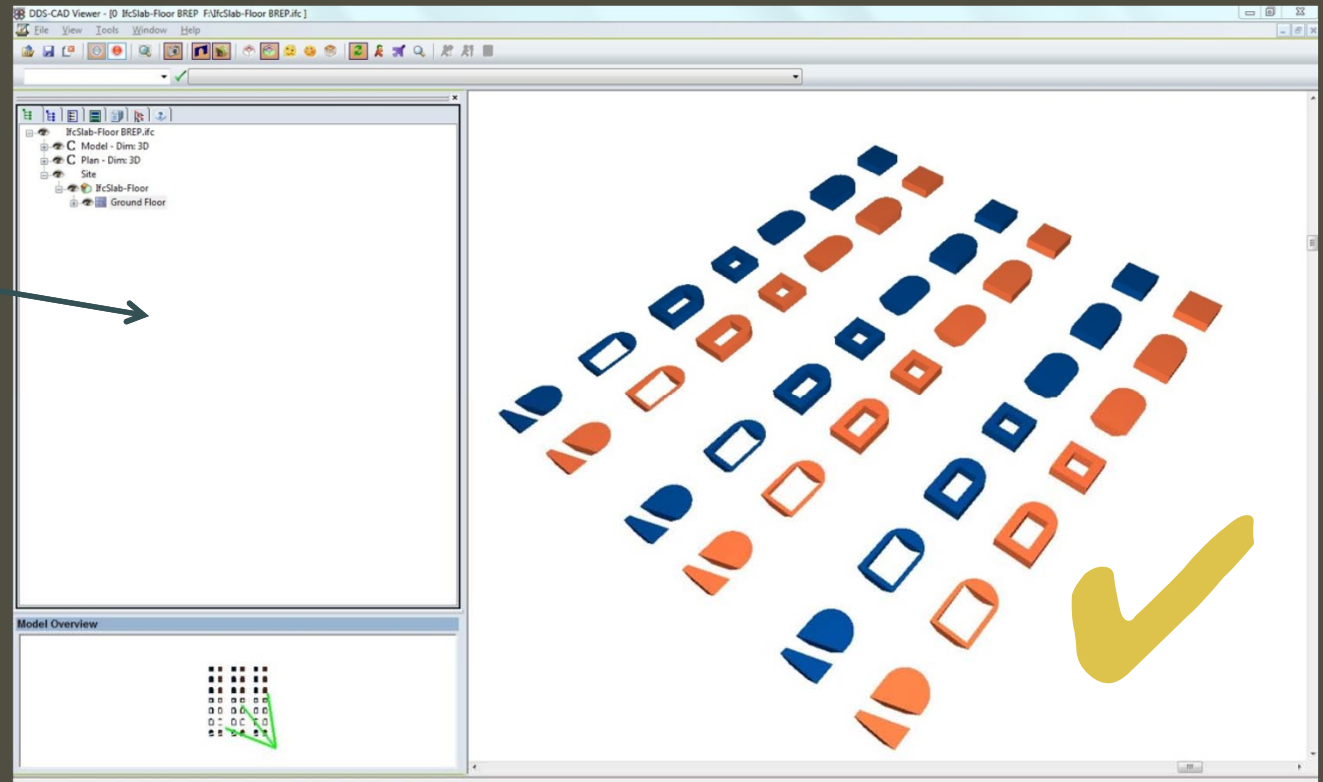
AUTODESK UNIVERSITY 2013

IFC THE GOOD THE BAD THE UGLY
#AU2013

THE GOOD



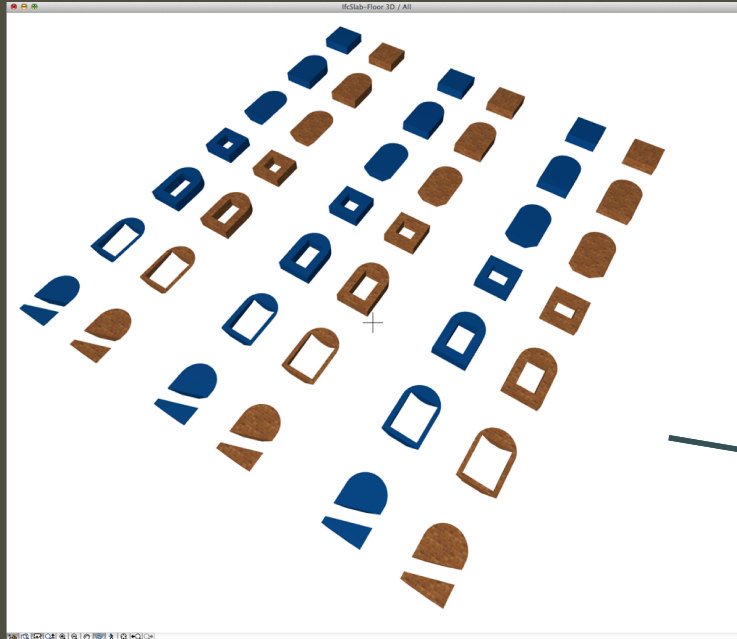
Graphisoft ArchiCAD 16



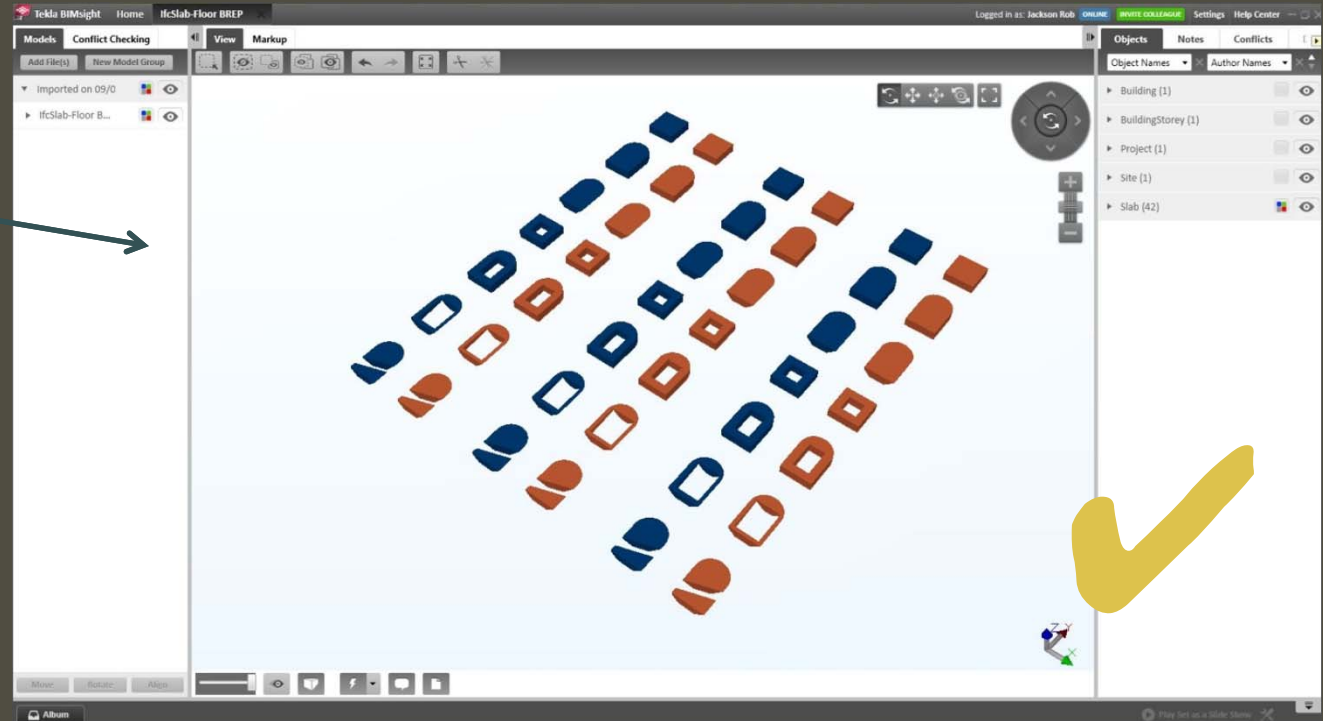
DDS-CAD Viewer



THE GOOD



Graphisoft ArchiCAD 16

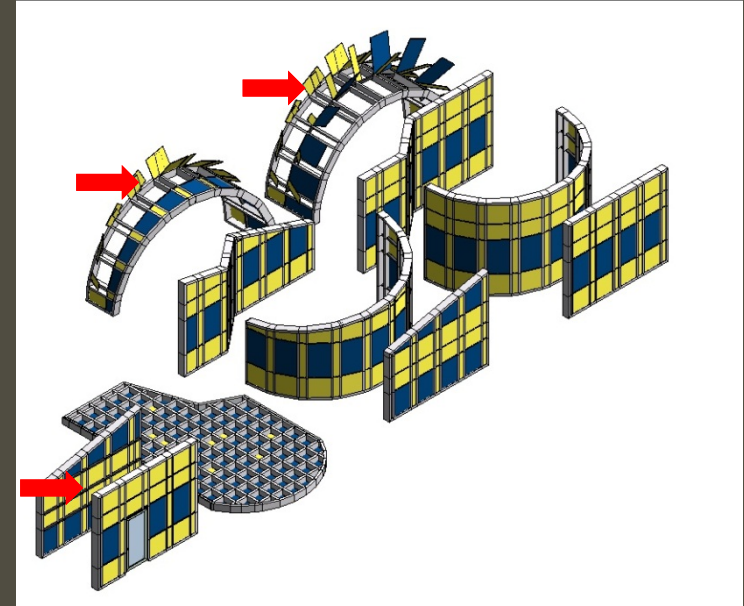
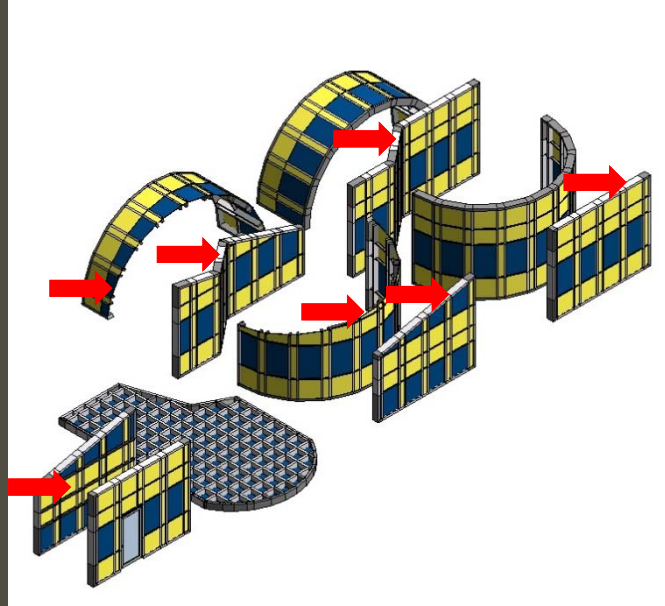
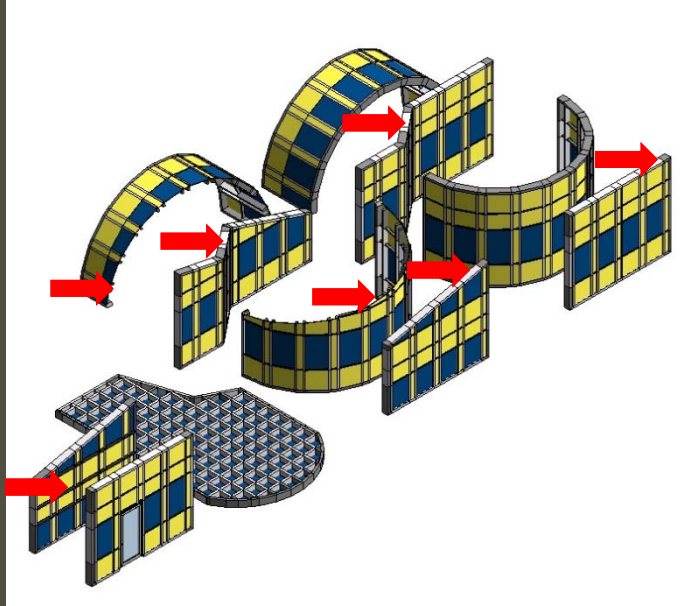


Tekla BIMsight v1.7.1



THE UGLY AND THE BAD

Curtain Wall – 3 different translators



Autodesk Revit 2013

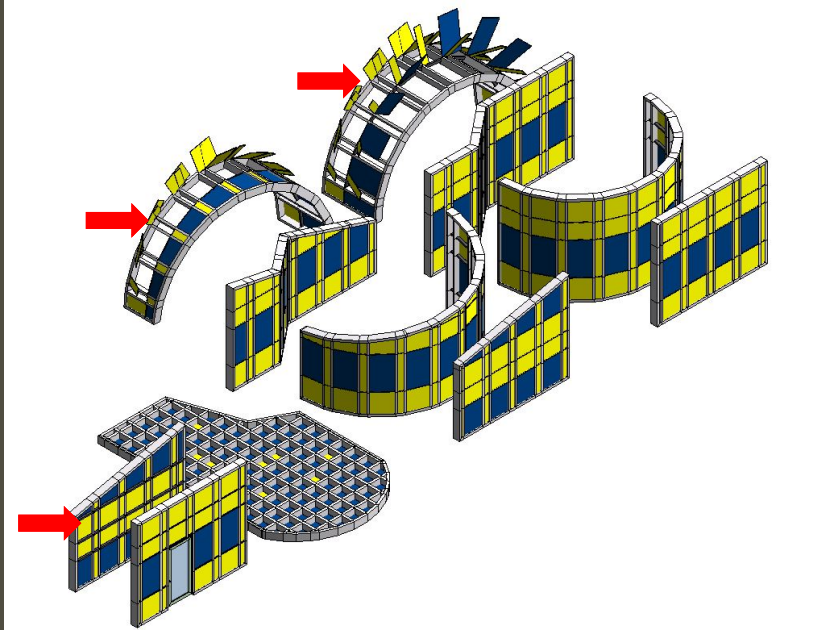


AUTODESK UNIVERSITY 2013

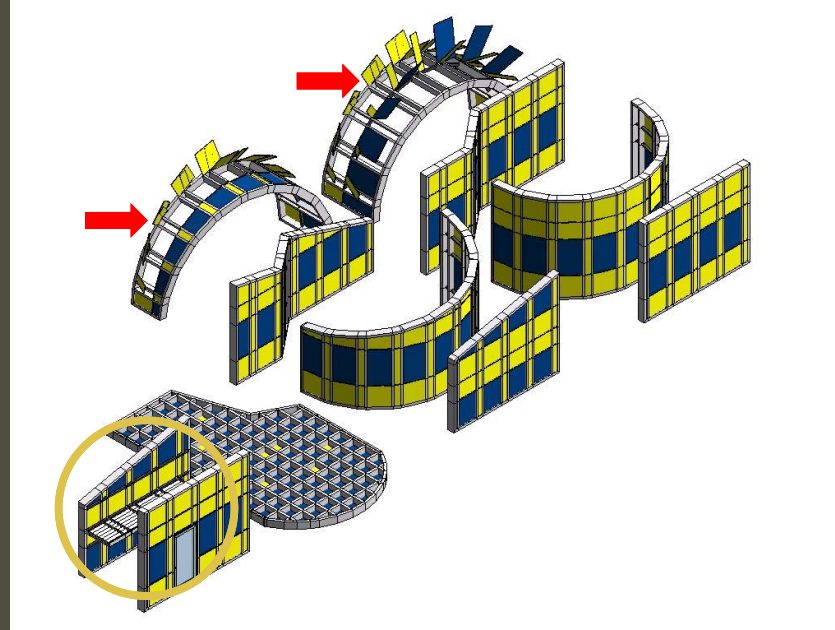
IFC THE GOOD THE BAD THE UGLY
#AU2013

THE BAD BECOMING GOOD

Curtain Wall



Autodesk Revit 2013

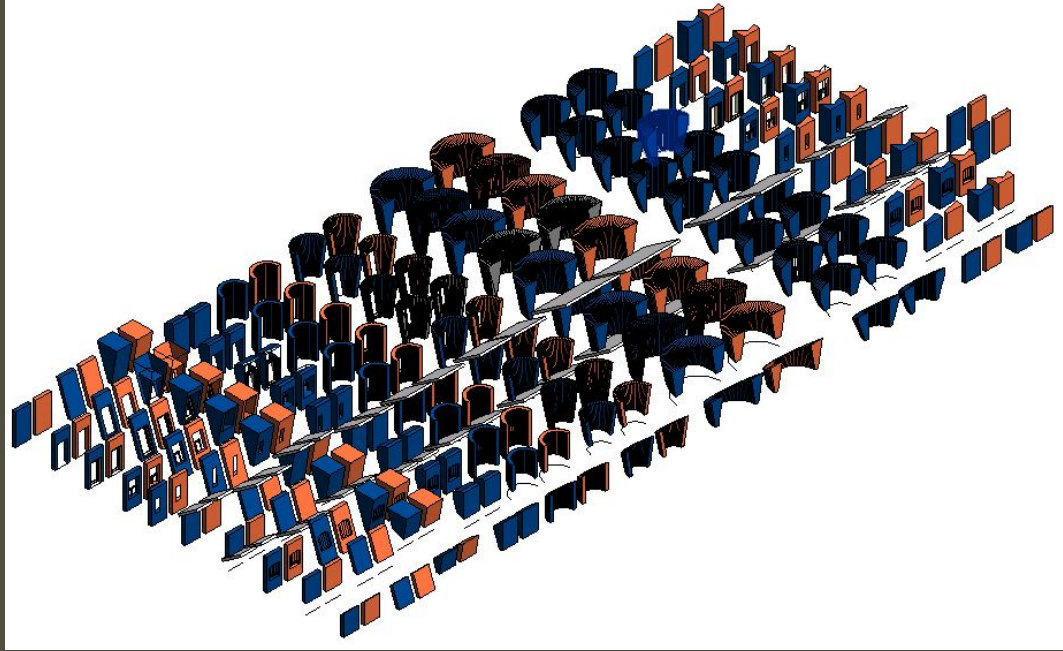


Autodesk Revit 2014

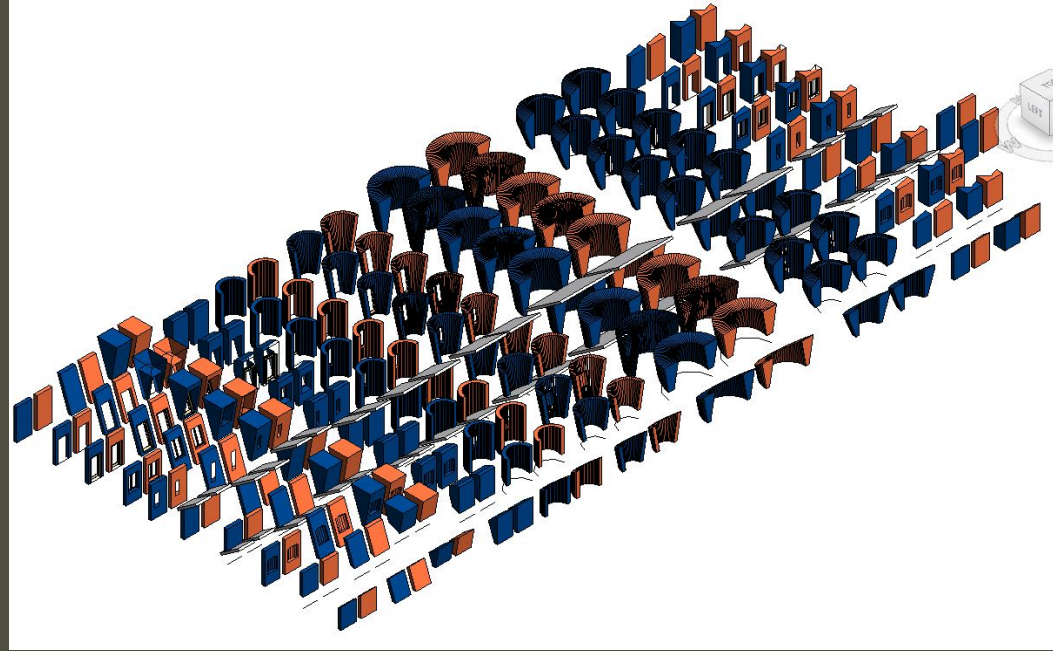


THE BAD

Walls



Autodesk Revit 2013



Autodesk Revit 2014

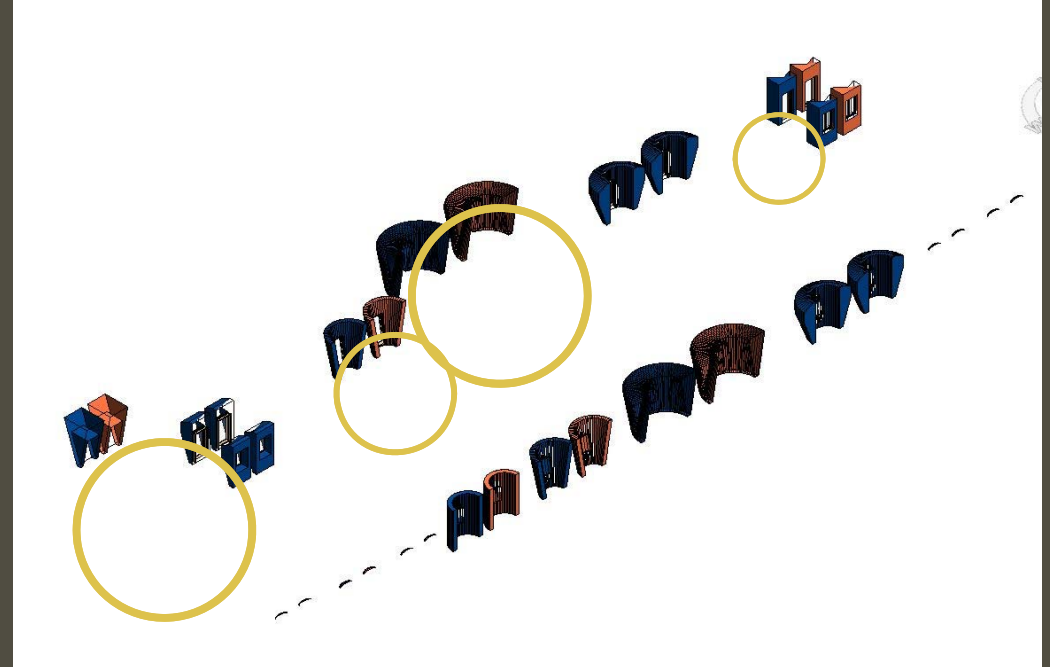


THE BAD BECOMING GOOD

Walls



Autodesk Revit 2013

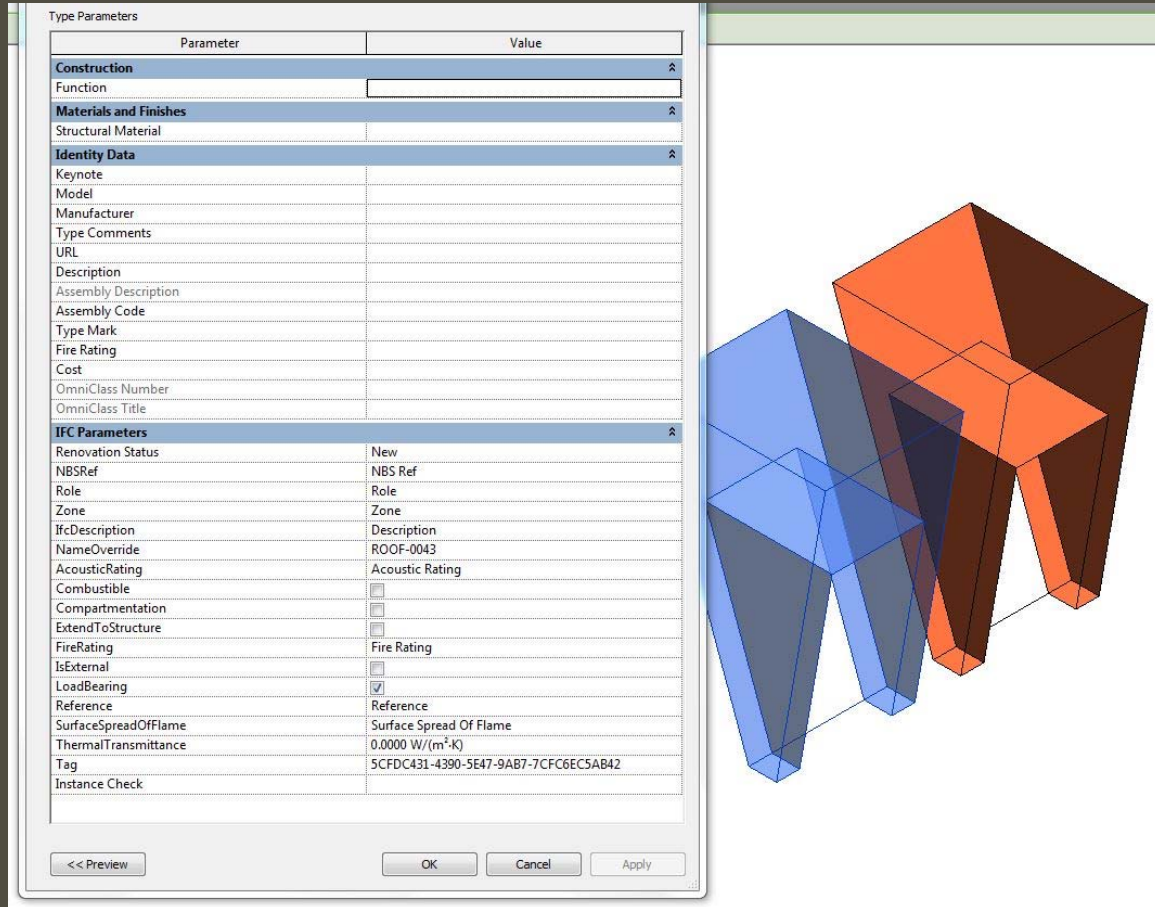


Autodesk Revit 2014



THE BAD / THE GOOD

Walls



Geometry not 100% although geometry exists

Data is OK

THE BAD BECOMING GOOD

Data

IFC Parameters	
Renovation Status	New
NBSRef	NBS Ref
Role	Role
Zone	Zone
AcousticRating	Acoustic Rating
Combustible	<input type="checkbox"/>
Compartmentation	<input type="checkbox"/>
ExtendToStructure	<input type="checkbox"/>
FireRating	Fire Rating
IsExternal	<input type="checkbox"/>
LoadBearing	<input checked="" type="checkbox"/>
Reference	Reference
SurfaceSpreadOfFlame	Surface Spread Of Flame
ThermalTransmittance	0.0000 W/(m ² ·K)
Instance Check	

Autodesk Revit 2013



IFC Parameters	
Renovation Status	New
NBSRef	NBS Ref
Role	Role
Zone	Zone
IfcDescription	Description
NameOverride	ROOF-0097
AcousticRating	Acoustic Rating
Combustible	<input type="checkbox"/>
Compartmentation	<input type="checkbox"/>
ExtendToStructure	<input type="checkbox"/>
FireRating	Fire Rating
IsExternal	<input type="checkbox"/>
LoadBearing	<input checked="" type="checkbox"/>
Reference	Reference
SurfaceSpreadOfFlame	Surface Spread Of Flame
ThermalTransmittance	0.0000 W/(m ² ·K)
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Instance Check	

Autodesk Revit 2014



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IFC THE GOOD THE BAD THE UGLY
#AU2013

SUCCESSFUL IFC EXCHANGE - ARCHICAD

	Revit 2014	Navisworks 2014	Solibri	DDS-CAD	Tekla BIMsight
• Geometry	✓	✓	✓	✓	✓
• Colour	✓	✓	✓	✓	✓
• Instance check	partial	✓	✓	✓	✓
• Material	✗	✓	✓	✓	✓
• Classification	✗	✓	✓	✓	✗
• Renovation status	✓	✓	✓	✓	✓
• ID or Name	✓	✓	✓	✓	✓
• GlobalId or GUID	✗ *	✓	✓	✓	✓
• Description	✓	✓	✗	✓	✓
• Tag or BATID	✓	✓	✓	✓	✗
• Predefined Type	✓	✓	✓	✓	✓
• IFC Property Set	✓	✓	✓	✓	✗
• BBA Property Set	✓	✓	✓	✓	✓
• Base Quantities	✓	✓	✓	✓	✗
• Layer	✗ **	✗	✓	✗	✓



IN SUMMARY - ARCHICAD

- Issues across all platforms
 - Base quantity data using ArchiCAD morph tool
 - Inconsistent colour behaviour with complex curved walls
 - Material data (layer and thickness) – not available using BREP method
 - Description field for Curtain Walls



IN SUMMARY - ARCHICAD

- Autodesk Revit 2013

Geometry

- Barrel vaulted curtain walls and curtain walls with accessories
- Windows in slanted, double slanted and complex walls and wall geometry
- Niches
- Openings in trapezoid and polygon walls

Data

- ID (Name), Classification, Description, Layer and Tag not transferred
- Property Sets for curtain walls
- Renovation status for spaces
- Elements converted to families and types (e.g. columns)

2D

- 2D display of wall element intersections and some door elements



IN SUMMARY - ARCHICAD

- Autodesk Revit 2014

Geometry

- Barrel vaulted curtain walls
- Niches
- Double slanted, curved and curved slanted walls

Data

- Classification and Layer not transferred
- Property Sets for curtain walls
- Renovation status for spaces
- Elements converted to families and types (e.g. columns and beams)

2D

- 2D display of wall element intersections and some door elements



IN SUMMARY - ARCHICAD

- Autodesk Navisworks 2013
 - Colour transfer of objects with more than one body colour
 - GUID data not transferred
 - Classification
 - Space geometry in 3D
- Autodesk Navisworks 2014
 - Layer displayed as floor level
 - Profile wall colour using BREP



IN SUMMARY - ARCHICAD

- DDS-CAD
 - Layer
 - Structural Function (LoadBearing) for Curtain Walls
- Exactal CostX
 - Classification not transferred
- Tekla BIMsight
 - IFC Property Sets, Tag and Classification not transferred



IN SUMMARY - ARCHICAD

- Solibri
 - Colour transfer of objects with more than one body colour
 - Niche quantification data incorrect
 - Description not transferred
 - Composition Type for Spaces

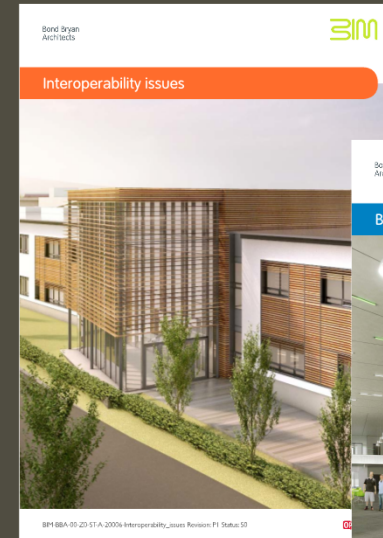


IN SUMMARY

Tools for successful data exchange with ArchiCAD

1. Favorites
2. Review models
3. Translators

1. Understand geometry / data exchange issues
2. Ensure the receiving party understands how to open the file



ONE FINAL SLIDE...OUR 'REVIT' PROJECT



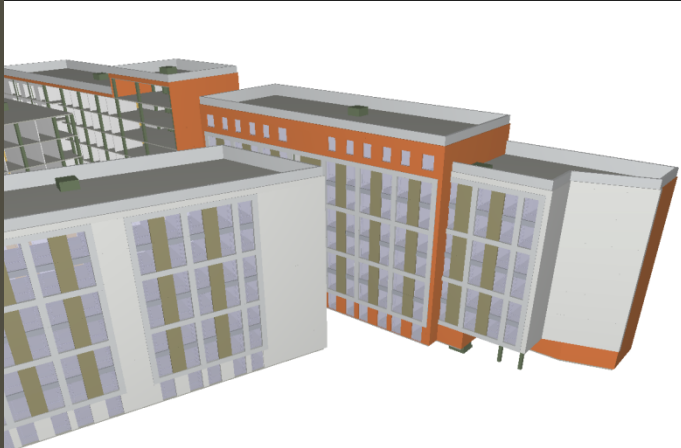
IFC reopened in GRAPHISOFT ArchiCAD 16



Autodesk REVIT 2014



Autodesk Navisworks 2014



Solibri Model Viewer v8



Tekla BIMsight v1.7.1



DDS-CAD Viewer



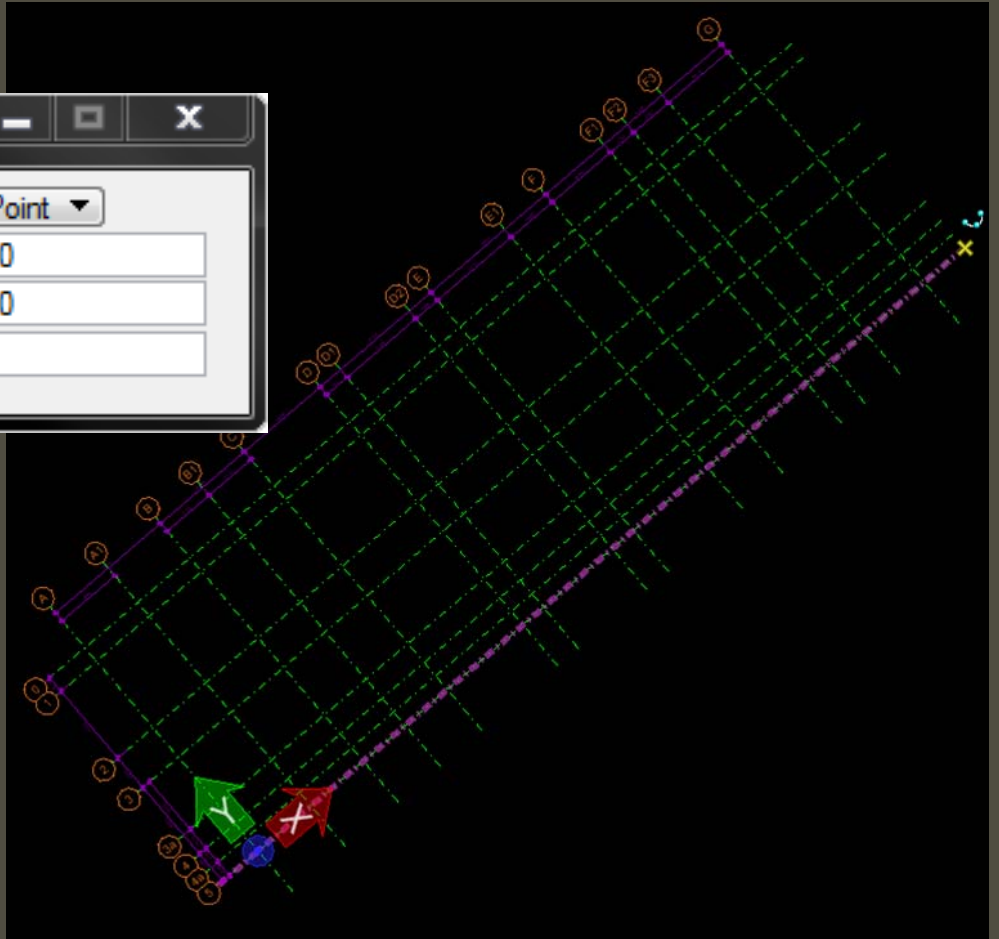
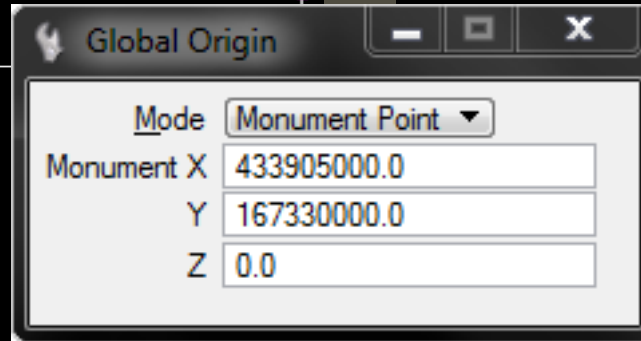
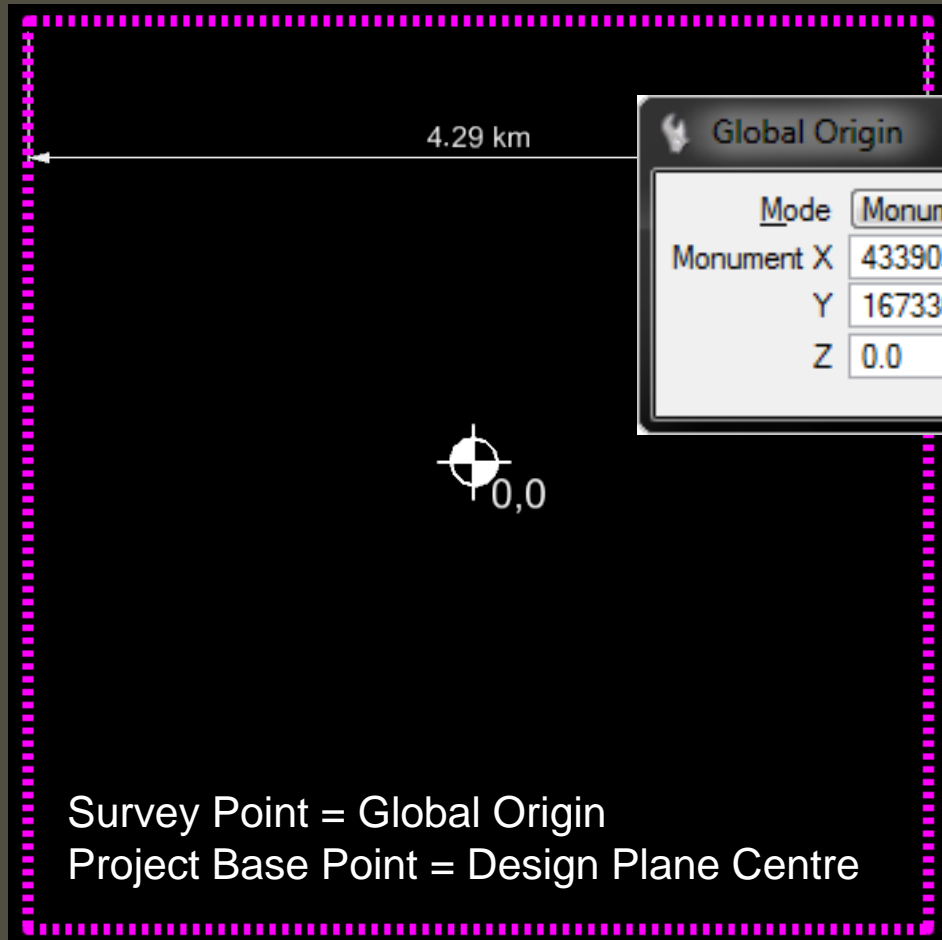
AUTODESK UNIVERSITY 2013

IFC THE GOOD THE BAD THE UGLY
#AU2013

A close-up, high-contrast photograph of an elderly man's face. The skin is heavily wrinkled, particularly around the eyes and forehead. The man has light-colored eyes and is looking directly at the camera with a serious, intense expression. The lighting is dramatic, with deep shadows and bright highlights on the skin.

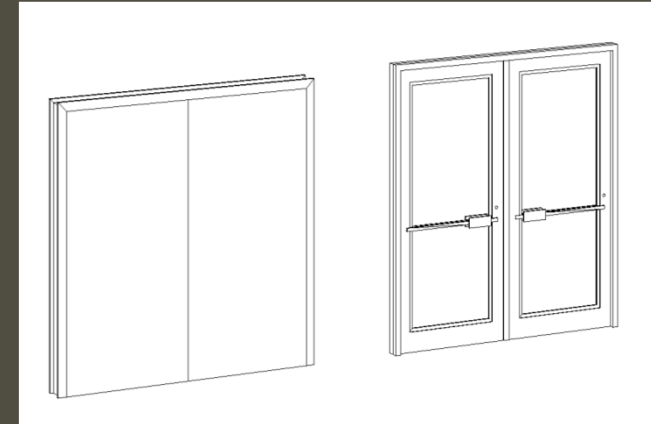
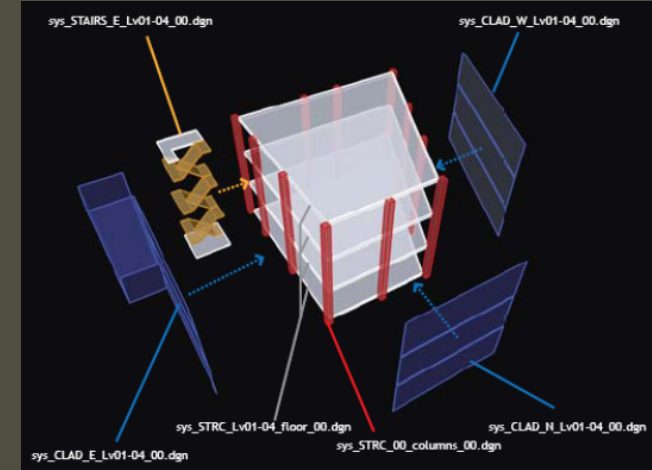
Bentley AECOsim Building Designer

AECOSIM BUILDING DESIGNER: COORDINATING COORDINATES



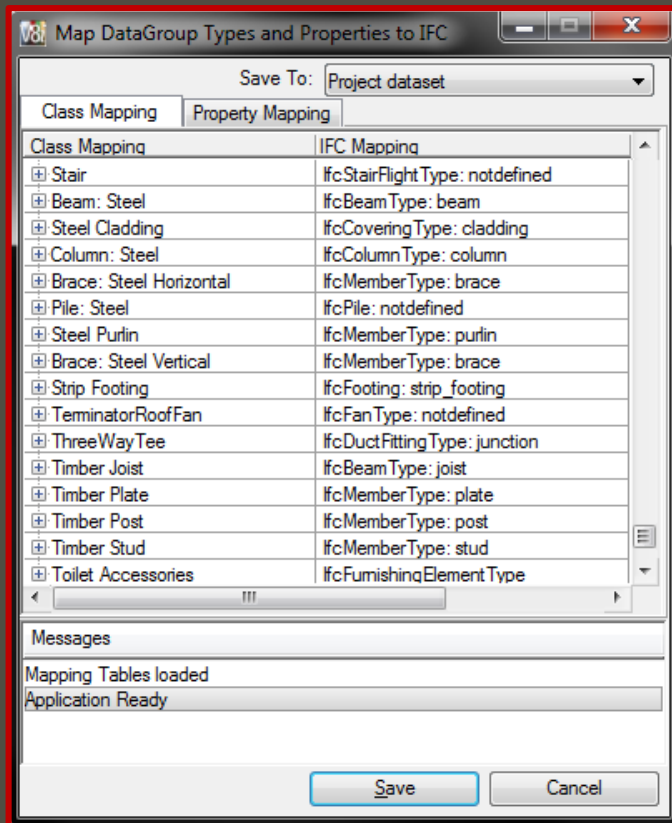
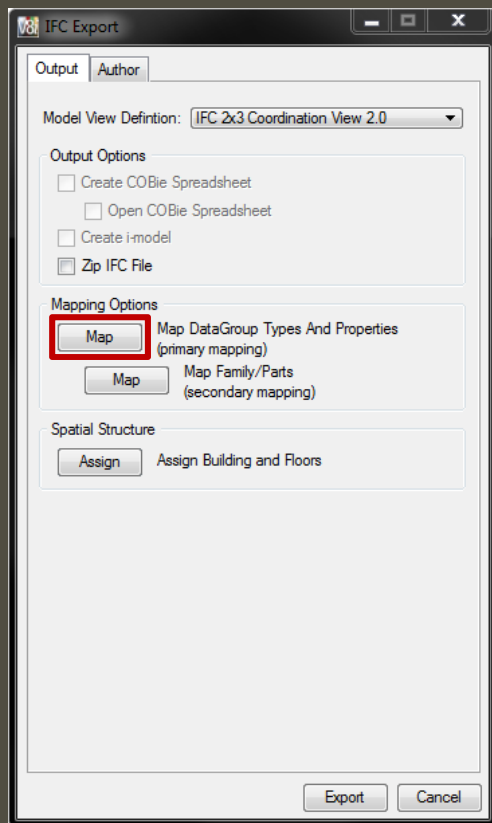
MODELLING METHODOLOGY

- Modelling for effective data exchange may be different to a “closed BIM” approach
- Breakdown of models
- Components
- Level of Definition (Development)
 - Level of Detail
 - Level of Information
- Understand the reason for your model



EXPORT OPTIONS: AECOSIM BUILDING DESIGNER

- How it works

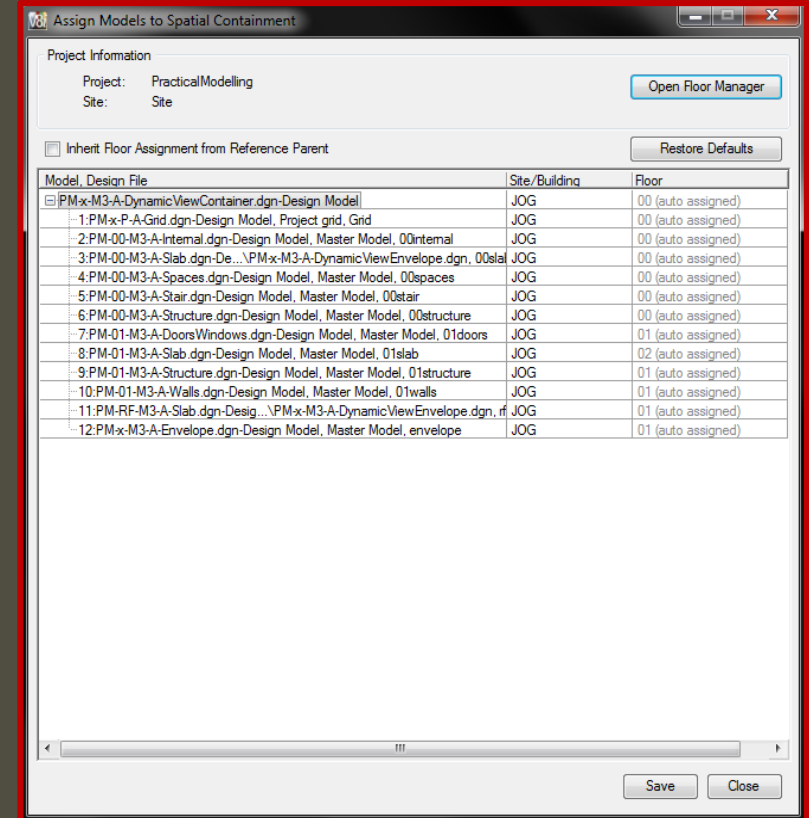
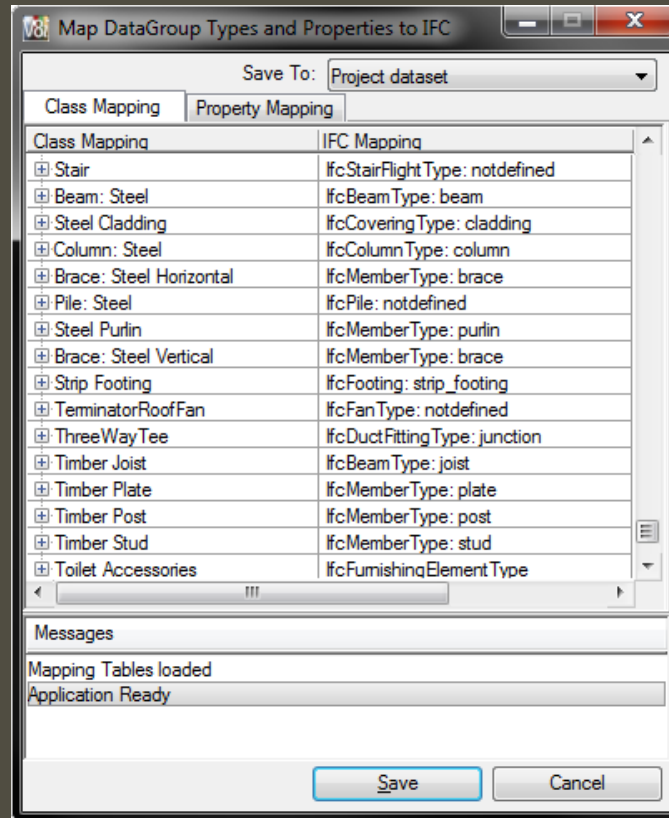
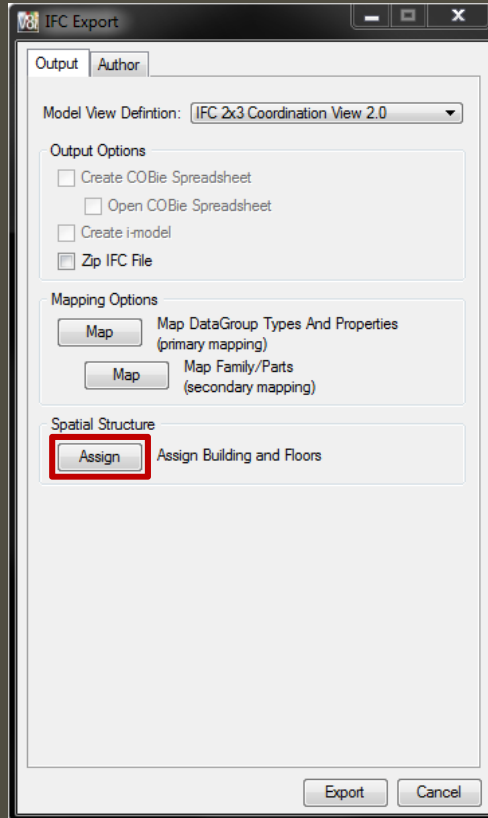


- Be aware that mappings are not always applied as you specify them!
e.g. IfcWallStandardCase



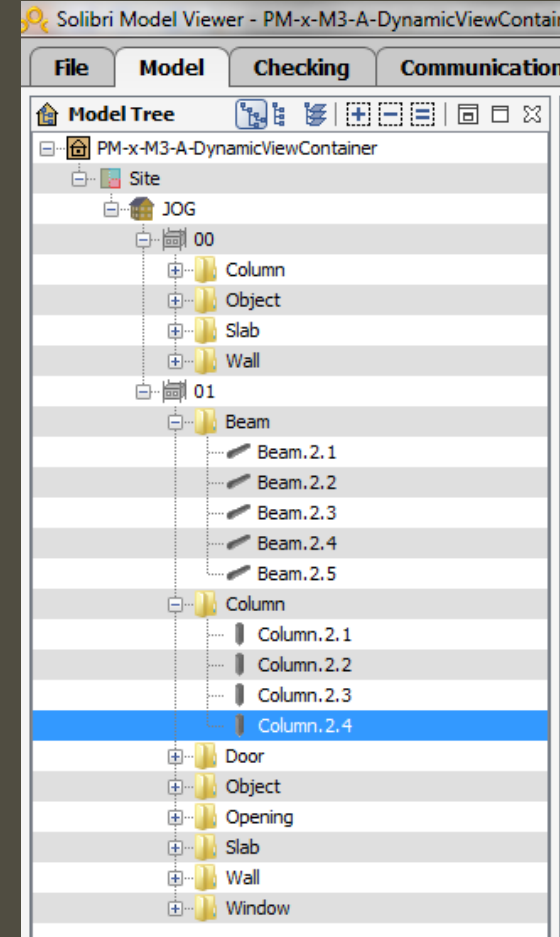
EXPORT OPTIONS: AECOSIM BUILDING DESIGNER

- How it works



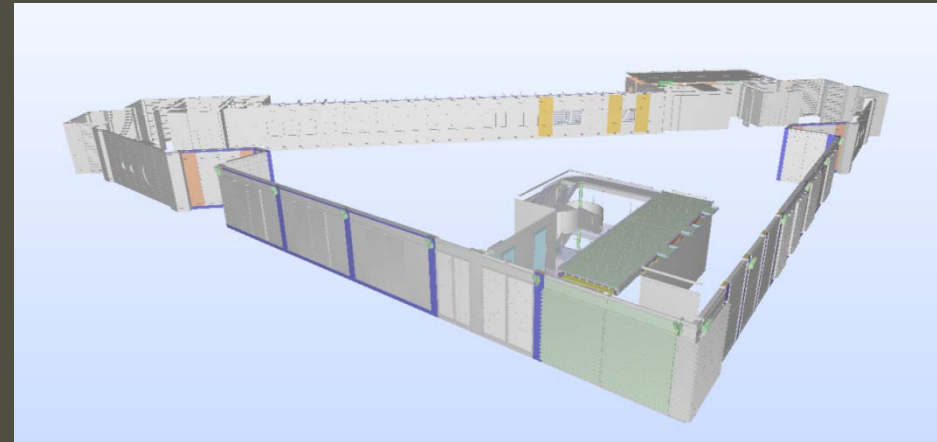
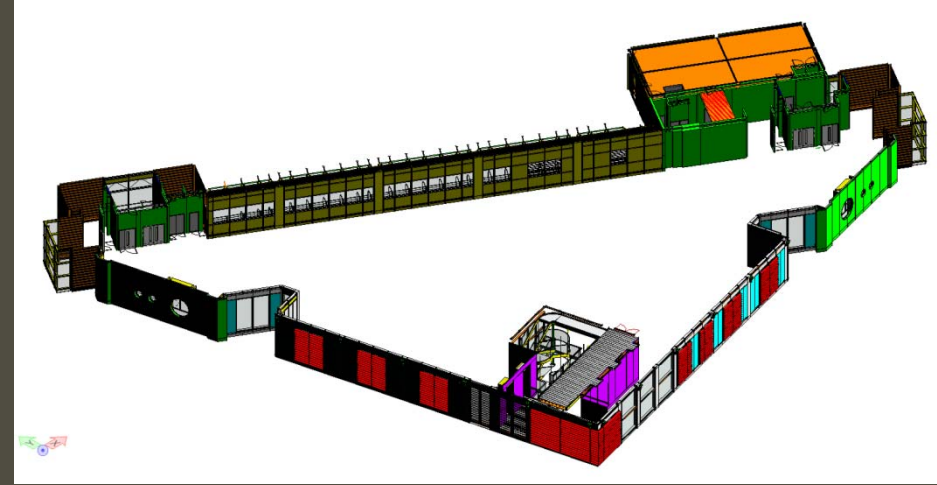
EXPORT OPTIONS: AECOSIM BUILDING DESIGNER

- The good
 - Geometry is accurate & in precise location
 - Location: Global X & Y
 - Floor assignment is automatic and is file-based
 - Floor Manager
 - Allows “fine-tuning”
 - Data is organised correctly
 - Classification supported
 - Classification: Classification
 - Custom properties are honoured
 - Direct COBie export
 - Round-trips perfectly



EXPORT OPTIONS: AECOSIM BUILDING DESIGNER

- The bad
 - Can be very slow
 - Crashes are (were) common
`IFC_RECOVERY = 1`
 - File sizes can be very large
 - 31MB DGN = 199MB (exploded) / 99MB
 - Optimised = 34MB
 - Colours incorrect (due to layer mapping)



EXPORT OPTIONS: AECOSIM BUILDING DESIGNER

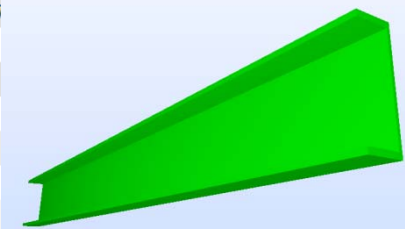
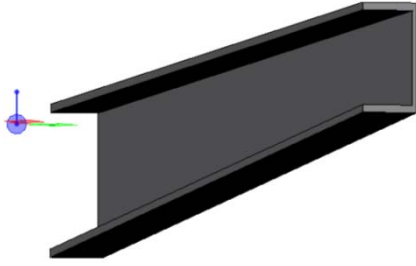
- The ugly
 - Incorrect layer mapping
 - Tapered members not supported

Info

Column.2.3

StructuralFramingCommon	StructuralQuantities	Thermal Transmittance
ObjectThermalTransmittance	Phasing	Structural Usage
ObjectFireResistance	ObjectMaterial	ObjectPhasing
BaseQuantities	Discipline	Fire Resistance
ObjectClassification	ObjectDiscipline	

Identification	Location	Quantities	Material	Profile	Relations	Classification	Hyperlinks
Property	Value						
Model	PM-x-M3-A-DynamicViewContainer						
Discipline	Architectural						
Name	A-G2623-ColumnsSteel						
Type	A-G2623-ColumnsSteel						
Material	A-G2:-:A-G2623-ColumnsSteel						
Layer	S-G26-M-BracingSteel-Cut						
Profile Type	Parametric						
Building Envelope	False						
Geometry	Extrusion						

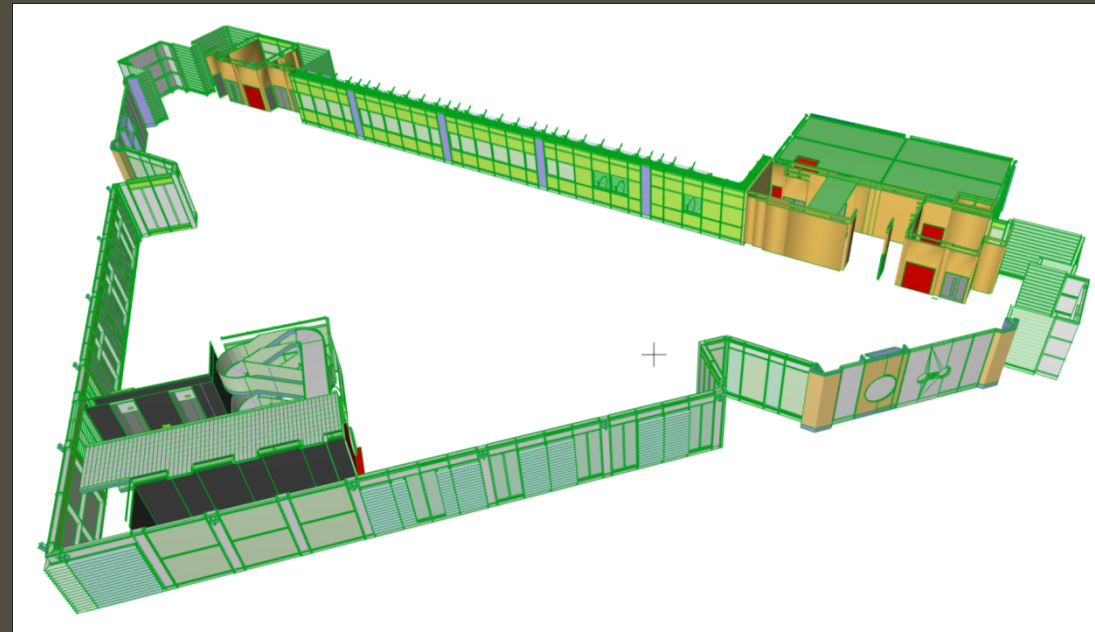


EXPORT OPTIONS: AECOSIM BUILDING DESIGNER

Results in ArchiCAD

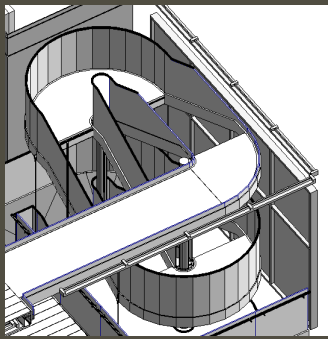
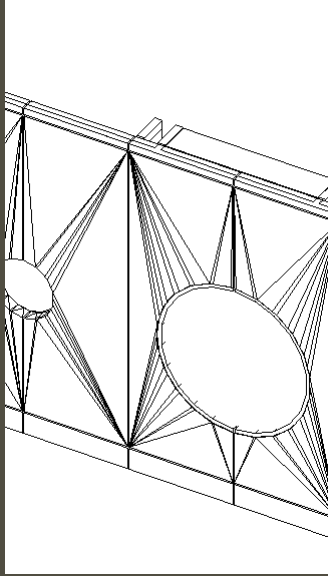
- The Good
 - Layers come in “correctly”
 - Data is complete
- The Bad
 - 2D display is pretty bad
 - Grids as objects; OK in 3D
 - Default IFC colours
 - Floors can be confusing (if mapping not carried out correctly)
- The Ugly
 - Door frames missing

			10000 A-G26-G-BeamTimb	IFC Import
			10000 A-G26-G-Brace	IFC Import
			10000 A-G26-G-ColStel	IFC Import
			10000 A-G26-G-Fram	IFC Import
			10000 A-G26-G-Stel	IFC Import
			10000 A-G312-G-FnshExtl	IFC Import
			10000 A-G312-G-FnshExtlClad	IFC Import



EXPORT OPTIONS: AECOSIM BUILDING DESIGNER

IFC Class Name	Category
IfcCovering	Ceilings
IfcCurtainWall	Ruled Curtain System
IfcDamperType	Generic Models
IfcDiscreteAccessory	Generic Models
IfcDistributionChamberElement	Generic Models
IfcDistributionChamberElement	Generic Models
IfcDistributionControlElement	Generic Models
IfcDistributionElement	Generic Models
IfcDistributionFlowElement	Generic Models
IfcDoor	Doors
IfcDuctFittingType	Generic Models
IfcDuctSegmentType	Generic Models
IfcDuctSilencerType	Generic Models
IfcElectricalEquipment	Generic Models
IfcElectricApplianceType	Generic Models
IfcElectricDistributionPoint	Generic Models
IfcElectricFlowStorageDeviceTy	Generic Models
IfcElectricGeneratorType	Generic Models
IfcElectricHeaterType	Generic Models
IfcElectricMotorType	Generic Models
IfcElectricTimeControlType	Generic Models
IfcElementAssembly	Generic Models
IfcEnergyConversionDevice	Generic Models



Results in Revit

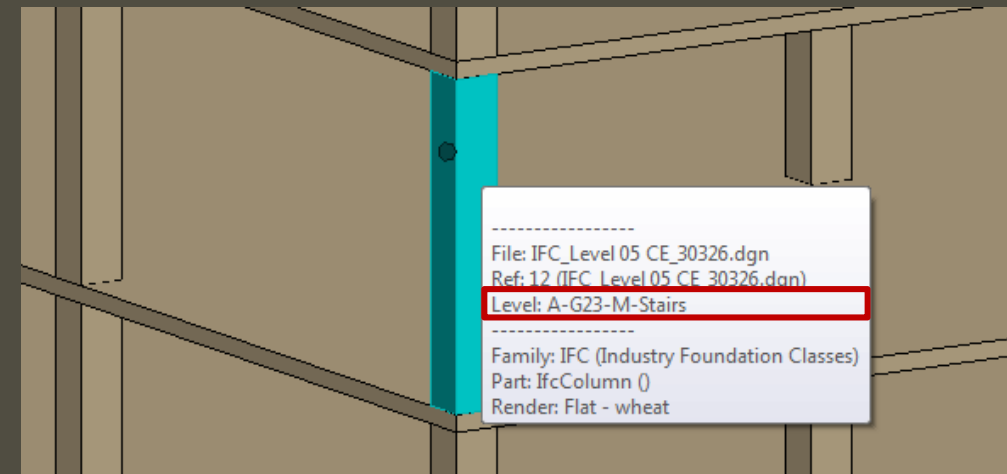
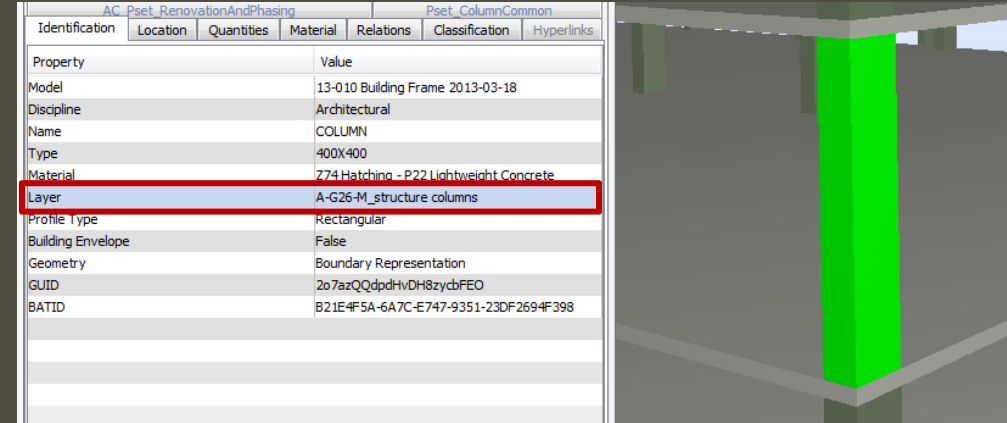
- The Good
 - Information is clear
 - Data supported: Type properties
- The Bad
 - The initial view can be misleading
 - Remapping necessary to avoid everything coming through as Generic Models
 - But you don't know what you've got till you've opened it!
 - Import does not like Real World Coordinates
 - Relocate model to 0,0,0, assign Site Coordinates later
 - Collaboration needs real world
 - Meshed panels (IFC issue but display in Revit)
- The Ugly
 - Stairs can be problematic



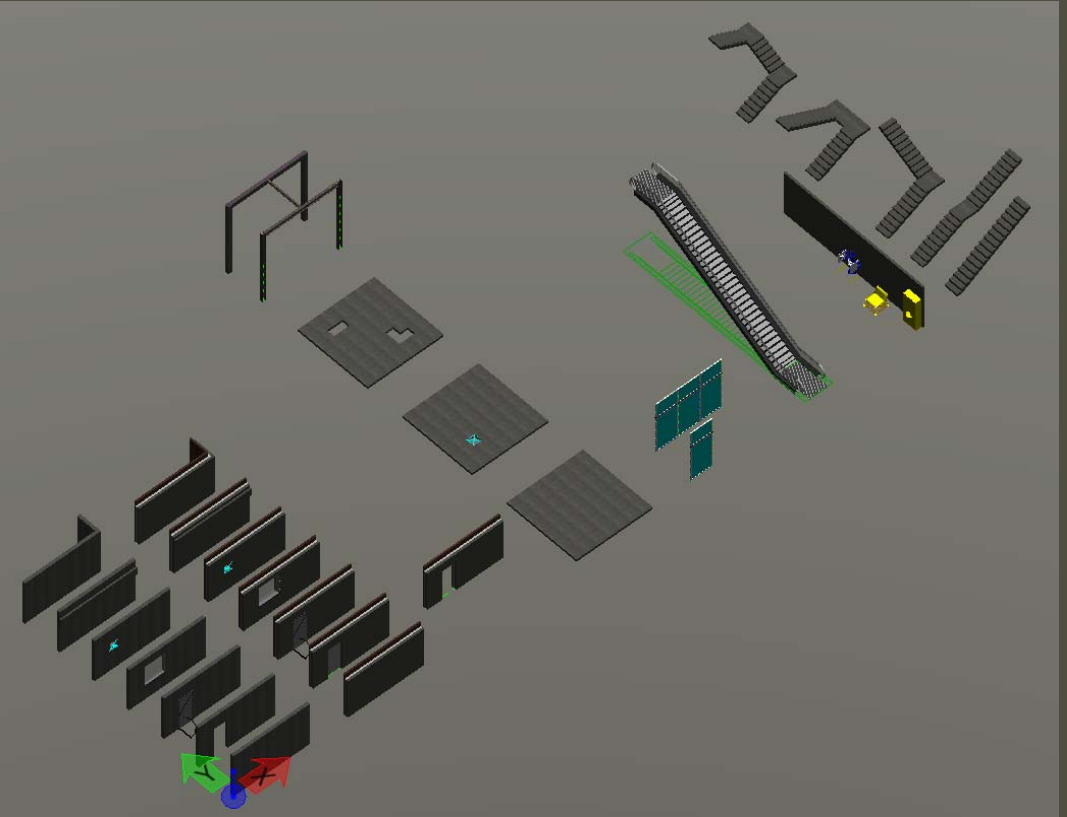
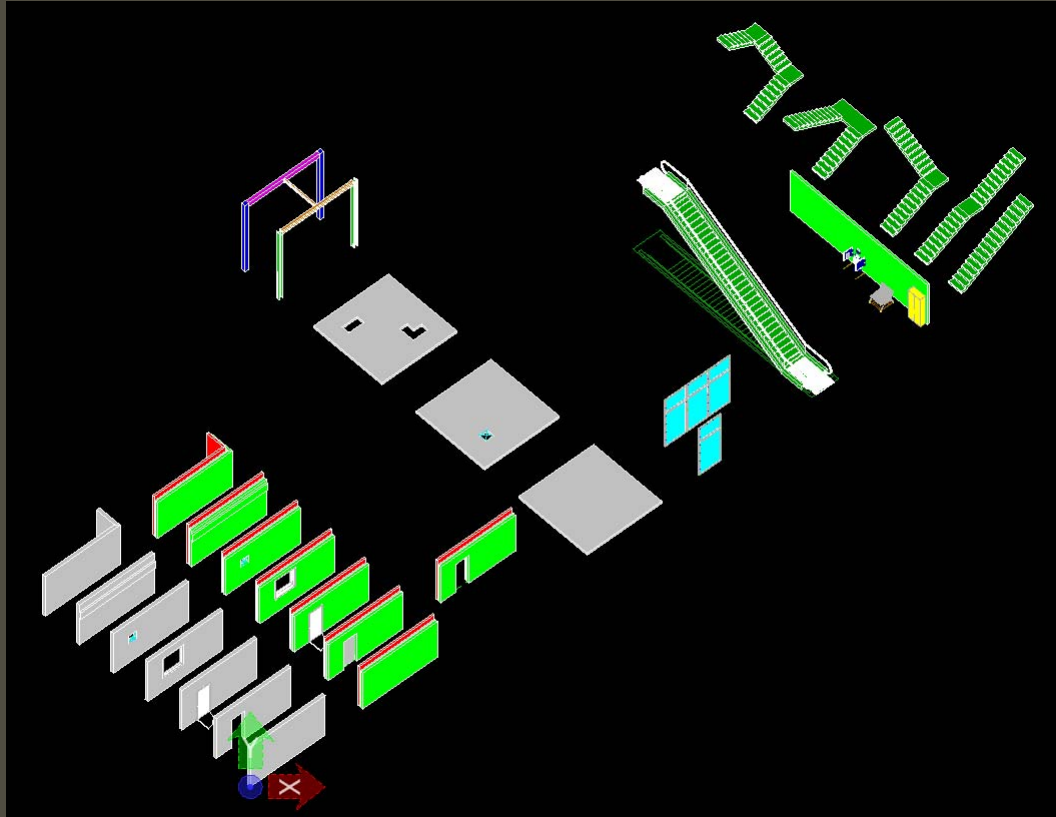
IMPORT: IFC FROM ARCHICAD

Results in AECOsim Building Designer

- The Good
 - Geometry is accurate
 - Data is complete
 - (Model not orientated to North)
 - Layers honoured when importing (but...)
- The Bad
 - Import options not available when opening an IFC or referencing
 - Open does not honour layers
 - Referencing creates layers based on object type
- The Ugly
 - “Import”
 - Creates multiple IFC references per floor
 - Import converts layers incorrectly
 - Do not use unless you move everything into a separate folder!



AECOSIM BUILDING DESIGNER: THE RESULTS



AECOSIM BUILDING DESIGNER: THE RESULTS

	Revit 2014	Navisworks 2014	Solibri	DDS-CAD	Tekla BIMsight
• Geometry	✓	✓	✓	✓	✓
• Colour	✓	✓	✗	✗	✓
• Material	✓	✓	✓	✗	✓
• Classification	✓	✓	✓	✓ ✓	✓
• ID or Name	✓	✓	✓	✓	✓
• GlobalId or GUID	✓	✓	✓	✓	✓
• Description	✓	✓	✓	✗	✓
• Predefined Type	✓	✓	✓	✓	✓
• IFC Property Set	✓	✓	✓	✓	✓
• Base Quantities	✓	✓	✓	✓	✓
• Layer	✗	✗	✓	✗	✓



A man with a mustache, wearing a dark fedora and a dark suit with a white shirt and dark tie, is shown in a close-up. He is holding a dark smoking pipe in his mouth and looking directly at the camera with a serious, slightly menacing expression. The background is a brick wall with a window and some wooden structures, suggesting an outdoor or semi-outdoor setting. The lighting is dramatic, with strong shadows.

Autodesk REVIT

COORDINATING COORDINATES: REVIT

Specify Shared Coordinates

Relocate this project in Shared Coordinates by specifying known values at the point you selected. Current project will move relative to globally positioned links.

New Coordinates

East/West: 433905000.0

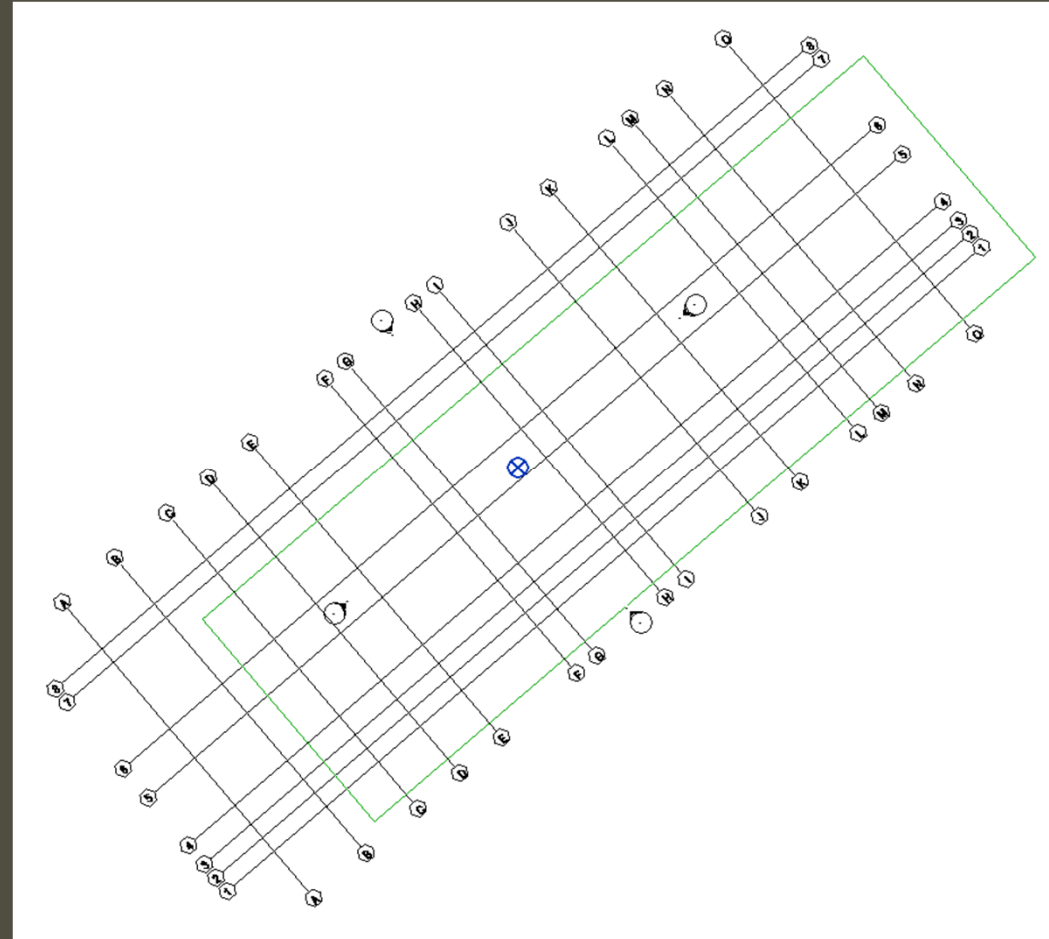
North/South: 167330000.0

Elevation: 0.0

Angle from Project North to True North

40° 28' 21" East

OK Cancel



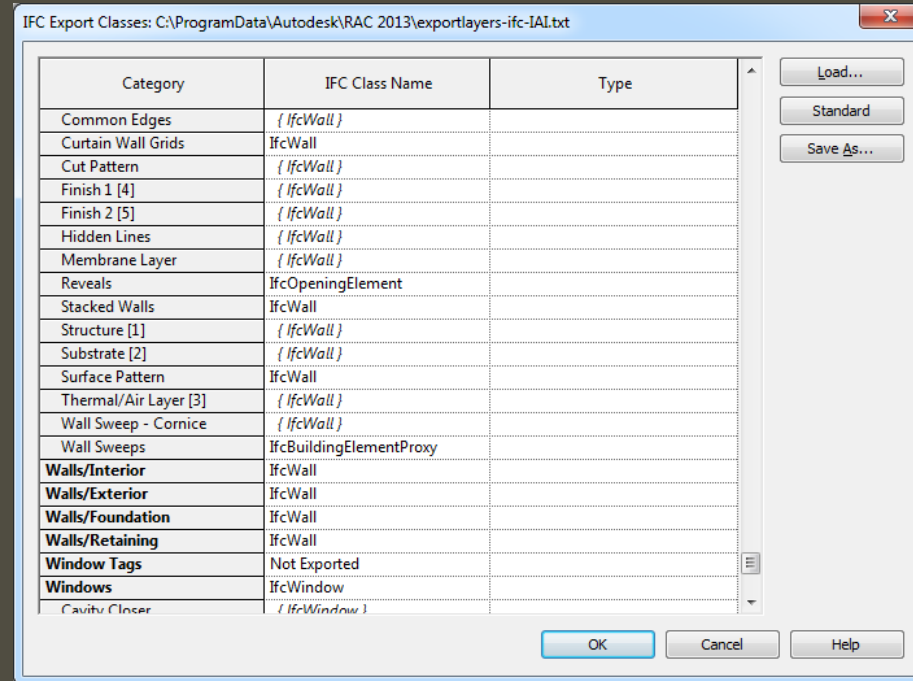
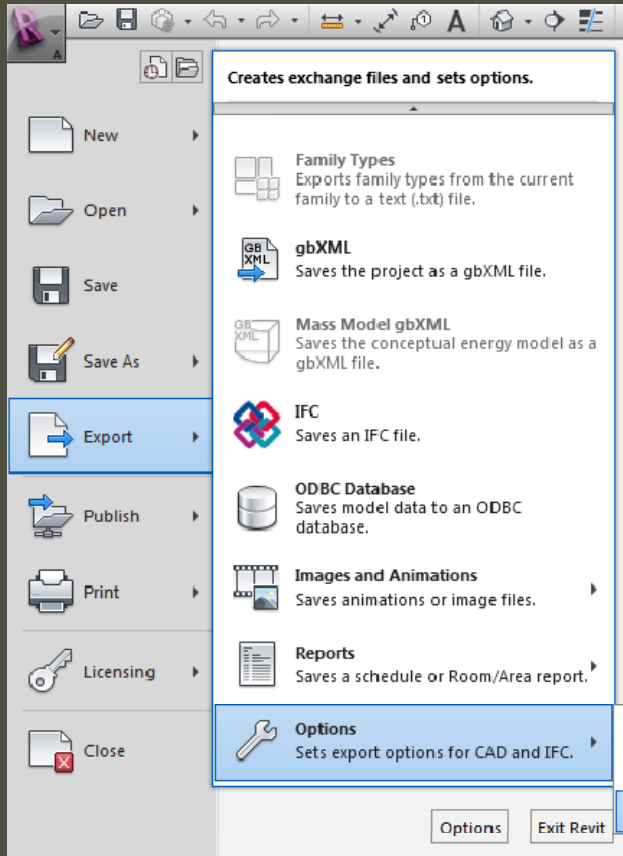
MODELLING METHODOLOGY

- Revit's approach being very much centred around the single model environment
- Families
- Level of Definition (Development)
 - Level of Detail
 - Level of Information
- Understand the reason for your model
 - IFC export formats (coordination, FM, cost, etc)



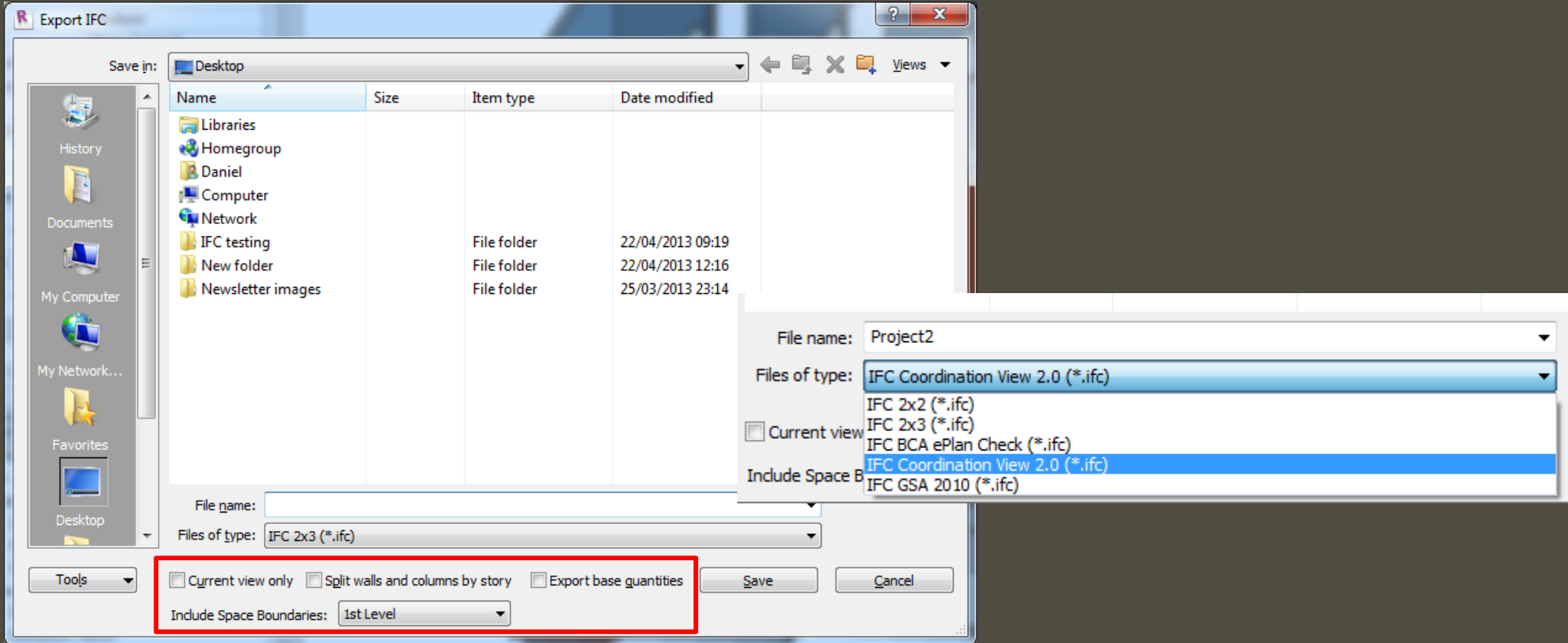
EXPORT OPTIONS: REVIT

- How it works



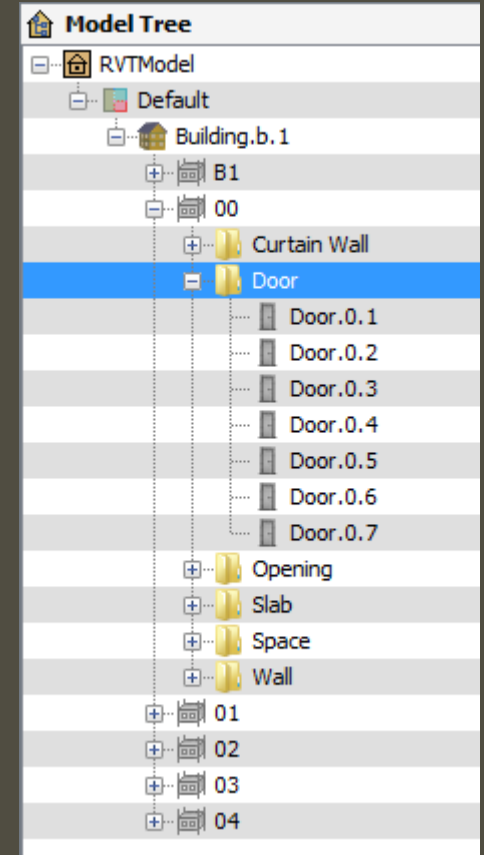
EXPORT OPTIONS: REVIT

- How it works



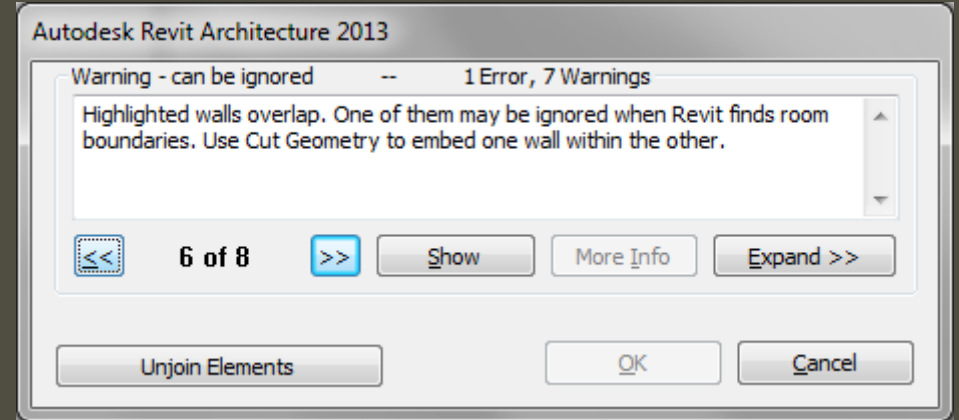
EXPORT OPTIONS: REVIT

- The Good
 - Geometry is accurate including curved elements without much faceting
 - Floor assignment is automatic and assigned to each object, correctly
 - Data is organised correctly
 - Objects are categorised correctly*
 - Both Instance and Type parameters are honoured
 - Exported IFC files are quite small



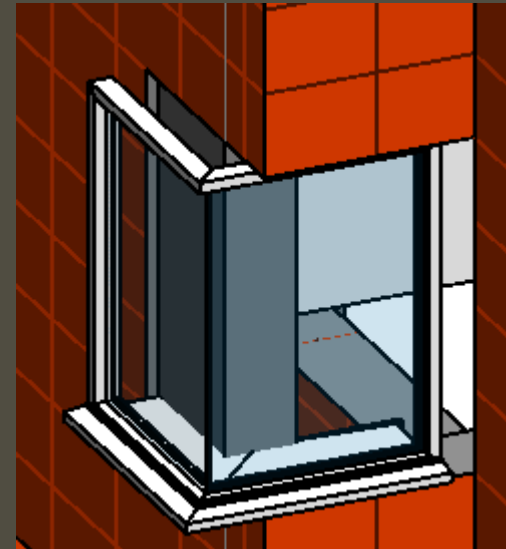
EXPORT OPTIONS: REVIT

- The Bad
- Revit doesn't seem to be able to export the correct coordinate system.
- * Categorisation does not support IFC "predefined types"
e.g. IfcBeam:Joist, IfcCovering:Ceiling
- If an object isn't hosted properly as Revit expects it will be deleted although, an opening will remain.
- Wall joins often have to be broken because Revit doesn't understand the relationship correctly.
- Constraints are lost when IFC is opened such as floor links and parametric elements



EXPORT OPTIONS: REVIT

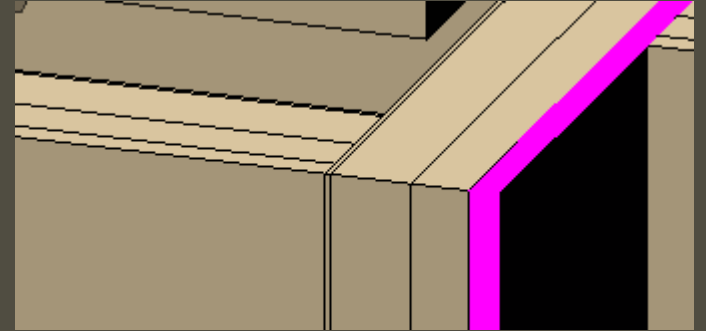
- The Ugly
 - Objects often 'shuffle' from their original location, especially when they are hosted in multiple objects.
 - Objects containing multiple materials often take on the appearance of the overall material instead of the relevant materials
 - Families are converted into dumb objects that can't be edited.



EXPORT OPTIONS: REVIT

Results in AECOsim Building Designer

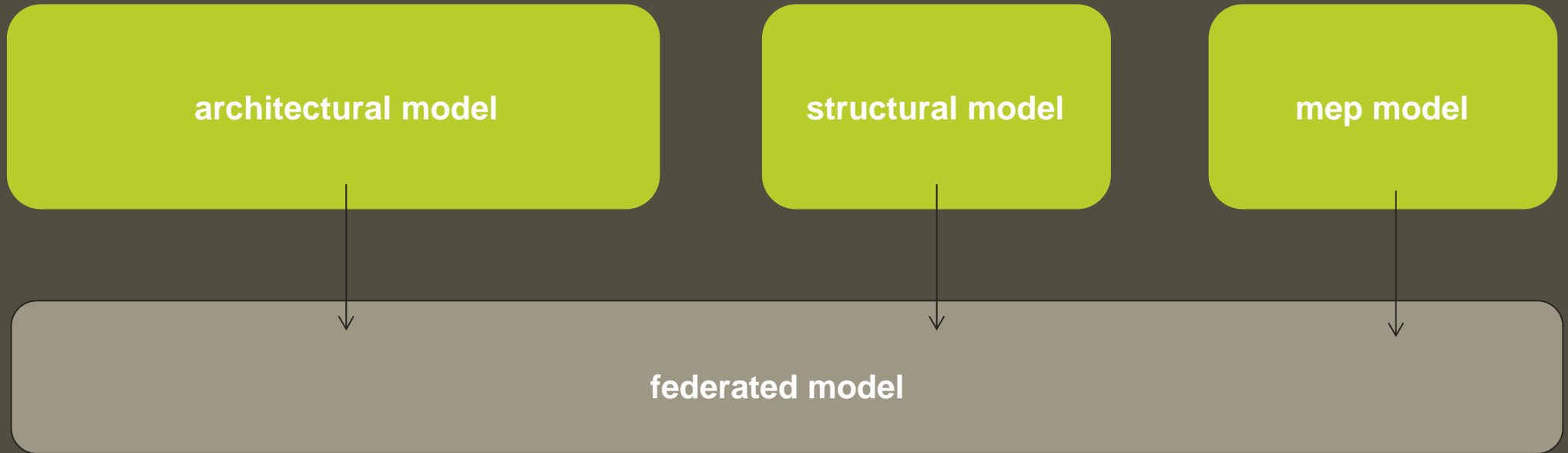
- The Good
 - Geometry accurate
 - Spaces import correctly
 - Orientation and location import correctly
- The Bad
 - Attribute information missing including door and window marks
 - Wall junctions break to show incorrect geometry.
- The Ugly
 - Info
 - Information can be confused; resymbolises in model views to show plan representation
 - Family and Part use the IFC Family and Part.



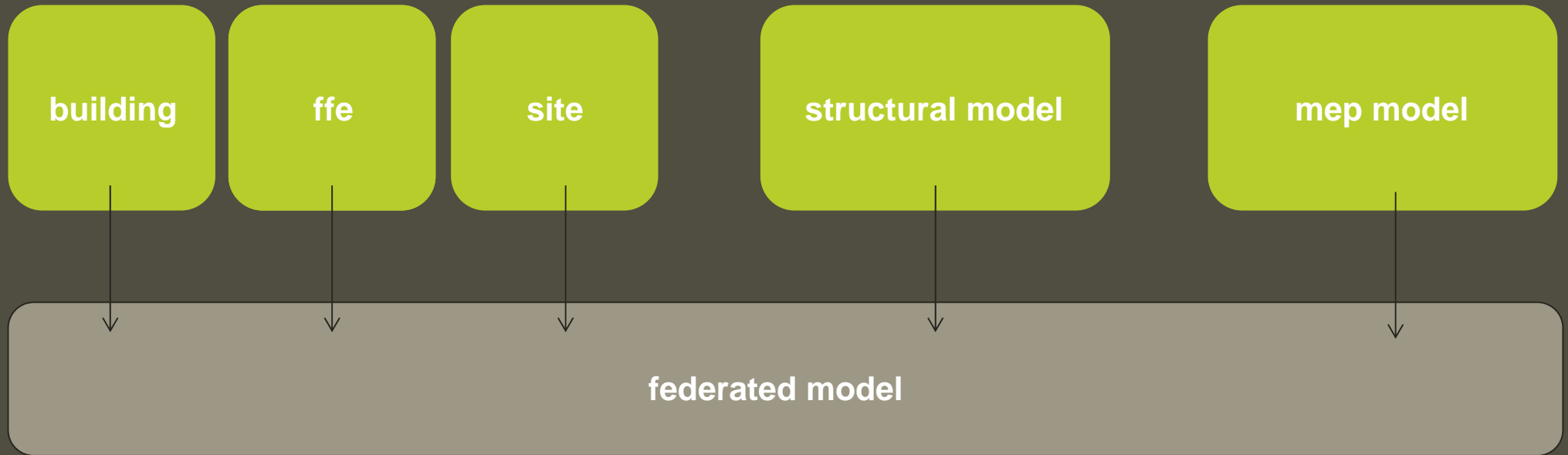
CONCLUSION



LARGE IFC FILES

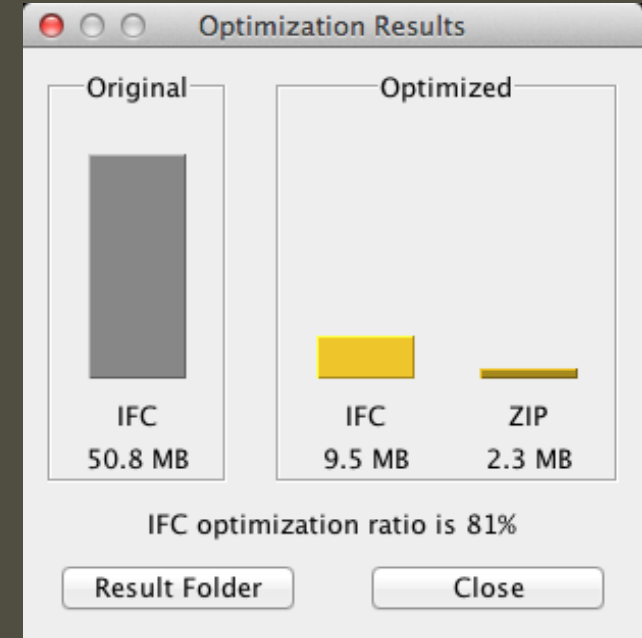
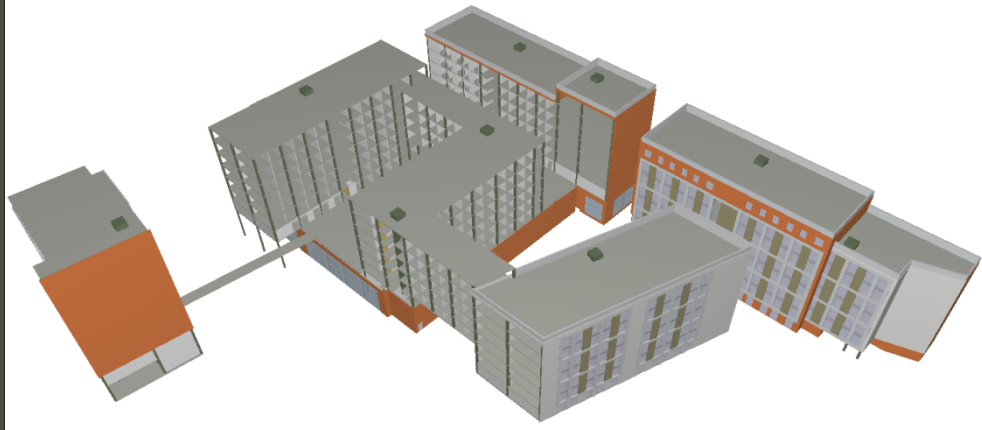


LARGE IFC FILES



LARGE IFC FILES

- Solibri IFC Optimizer (or Datacubist simplebim)



CONCLUSION

- Level 01
 - Fully parametric elements and parametric objects
- Level 02
 - Fully parametric elements and static objects
 - Extruded geometry
- Level 03
 - Mix of parametric and static elements and static objects
 - Mix of extruded geometry and boundary representation (BREP)
- Level 04
 - Static elements and objects
 - Boundary representation (BREP)



CONCLUSION

- **Level 01**
 - Fully parametric elements and parametric objects

IFC4
- **Level 02**
 - Fully parametric elements and static objects
 - Extruded geometry

IFC2x3
- **Level 03**
 - Mix of parametric and static elements and static objects
 - Mix of extruded geometry and boundary representation (BREP)

- **Level 04**
 - Static elements and objects
 - Boundary representation (BREP)

**Suitable for co-ordination,
clash detection,
costing, time lining**



CONCLUSION

- Level 01
 - Fully parametric elements and parametric objectsIFC4
- Level 02
 - Fully parametric elements and static objects
 - Extruded geometryIFC2x3
- Level 03
 - Mix of parametric and static elements and static objects
 - Mix of extruded geometry and boundary representation (BREP)
- Level 04
 - Static elements and objects
 - Boundary representation (BREP)Suitable for co-ordination, clash detection, costing, time lining



CONCLUSION

Successful exchange requires consideration of -

- export capabilities
- import capabilities
- user error
- limitations of the format (particularly complex modelling)



CONCLUSION

Things to note -

- not always the appropriate or best method for file exchange
- required at BIM Level 2 (which is...?)
- almost impossible to use a fully proprietary solution throughout a whole project



CONCLUSION

IFC implementation takes understanding and knowledge -

- modelling for IFC exchange requires specific approach
- preparation and planning
- requires understanding of the intricacies of software – and not just your own
- requires skill and understanding by users to implement



CONCLUSION

IFC is not perfect -

- however as a format it is NOT broken
- implementation of the standard by ALL software vendors requires more work
- approval process needs to be tougher
- issues need to be reported by users to vendors



CONCLUSION

IFC 2x3 can and does work on the vast majority of projects

and fundamentally....

WE MUST ALL BE ABLE TO USE THE SOFTWARE OF OUR CHOICE



QUESTIONS

