

第2回土木IFCセミナー

2018年9月19日（水）13：00～17：10

AP市ヶ谷 Learning Space

## I-1. IFCの概要

buildingSMART Japan

インフラストラクチャ小委員会 委員長

**有賀 貴志**

（株式会社 コンポート）

# IFC

Industry Foundation Classes

# MVD

Model View Definition

# IFC

Industry Foundation Classes

施設のすべての情報をデジタル化する

**IFC 2x3****IFC 4****IFC 4x1****IFC 5**

2007  
建築

ISO16739:2013  
建築

2017  
線形を追加

2020  
土木対応

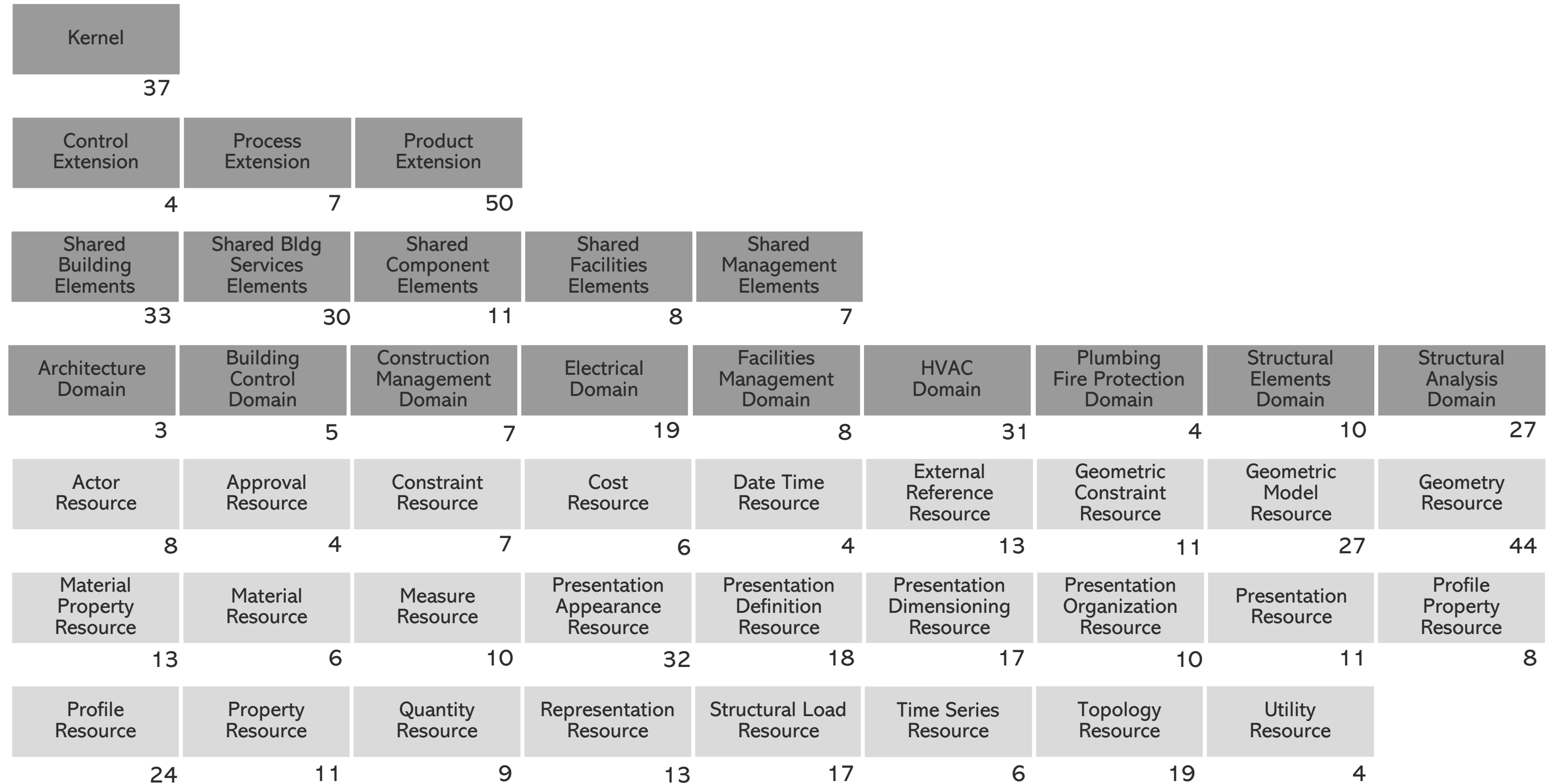
**.ifc**

ISO 10303 Part21

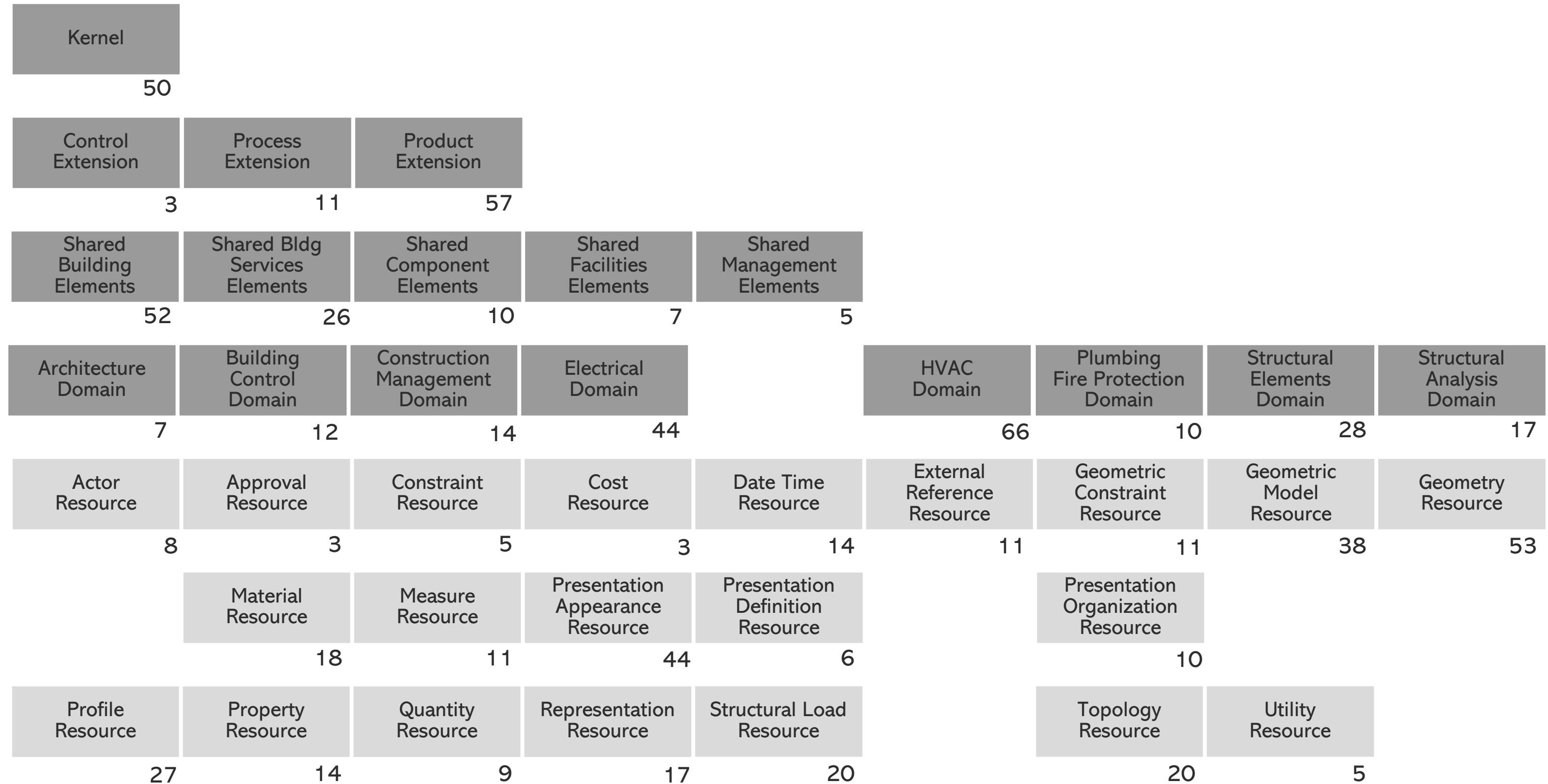
**.ifcXML**

ISO 10303 Part28

# IFC2x3 Schema

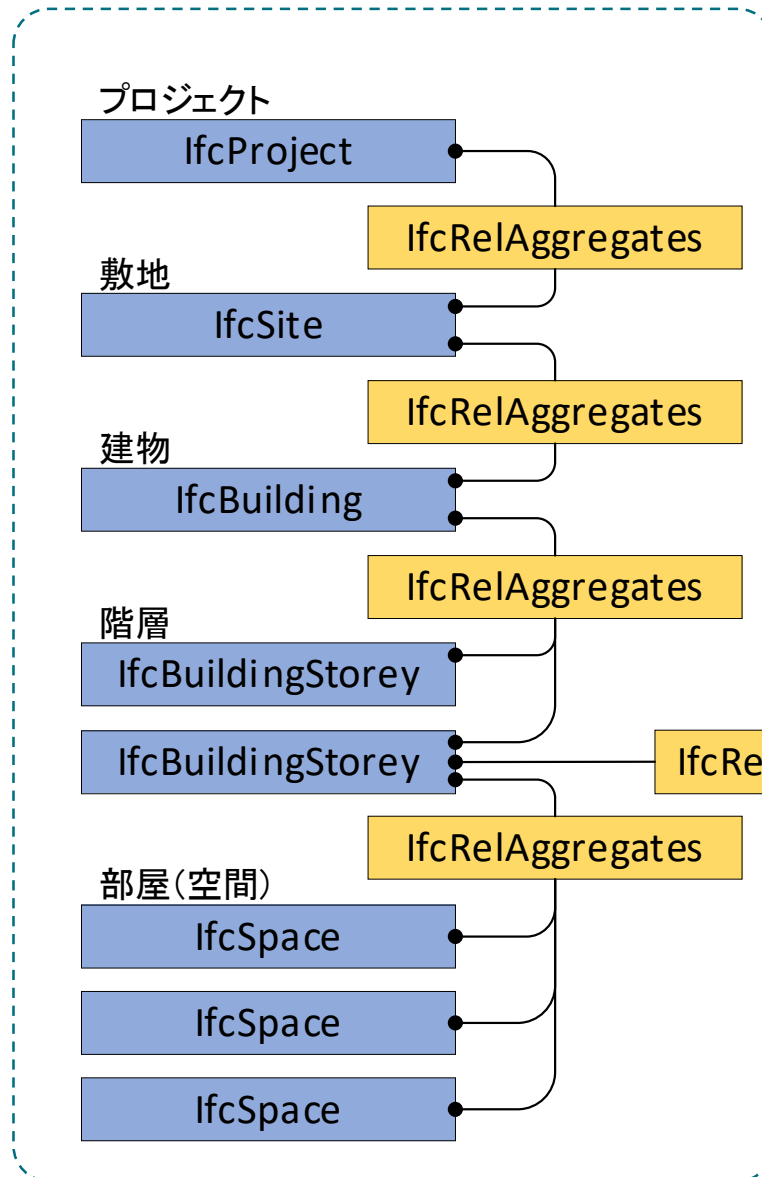


# IFC4 Schema

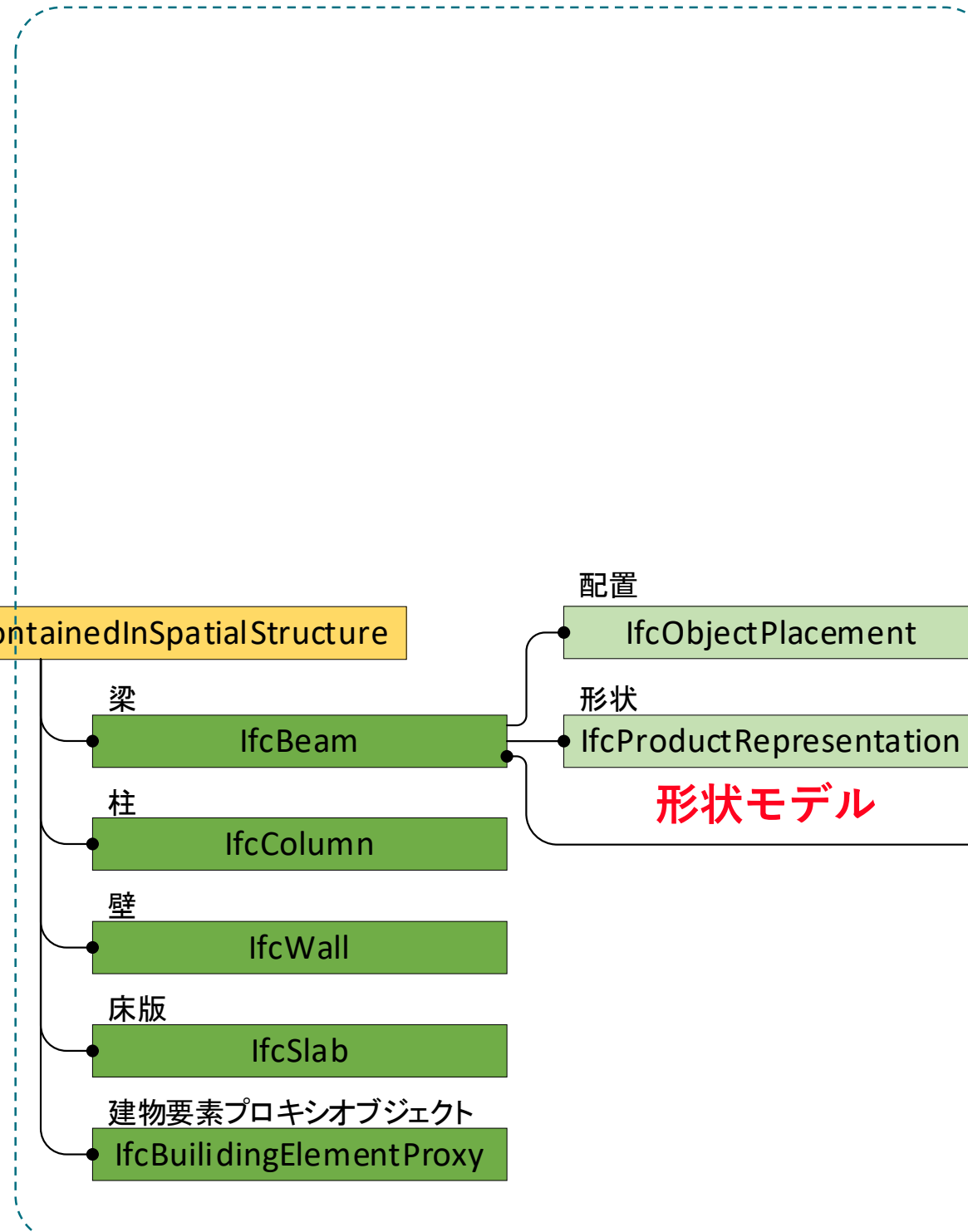


# IFC 基本構成

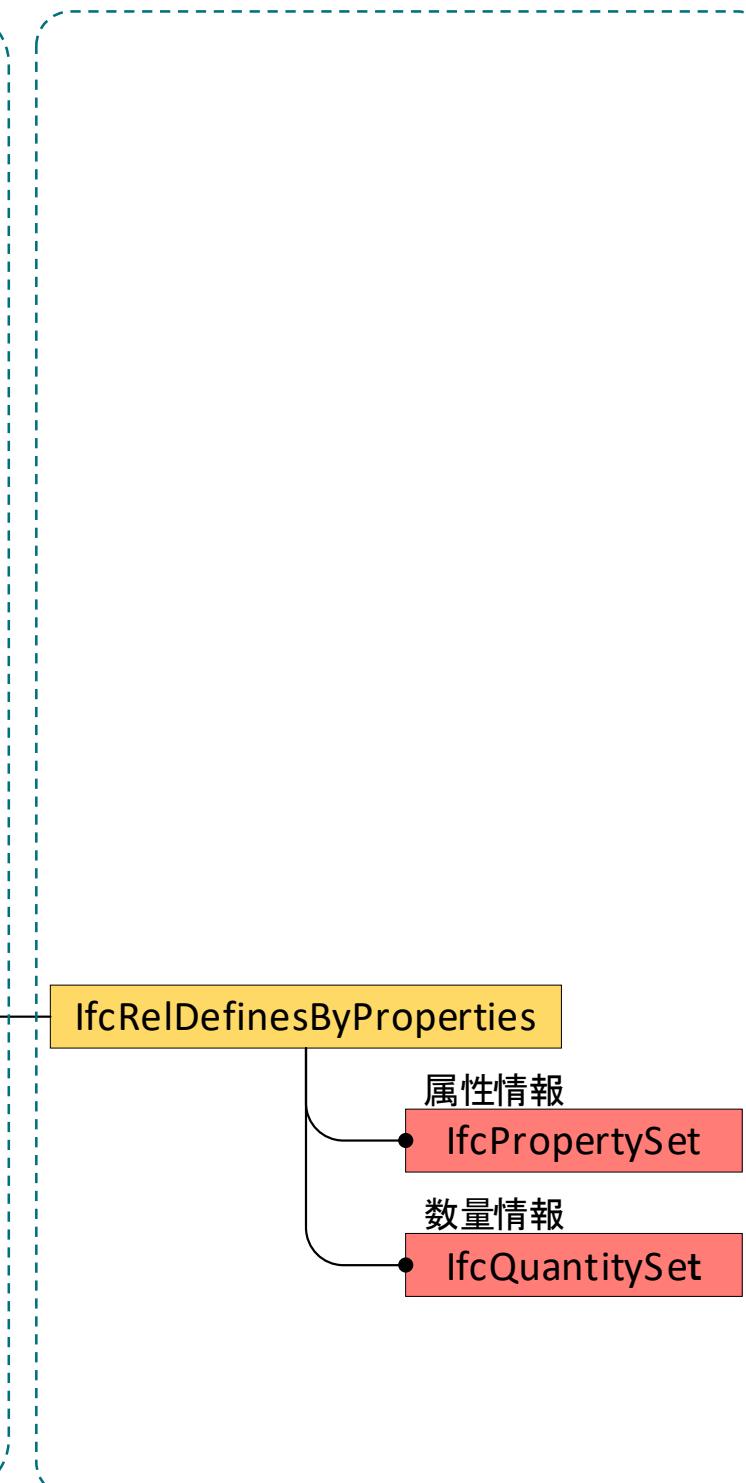
## 空間構造 (モデル構成)



## オブジェクト



## 属性情報 数量情報





# IFC 基本構成

**空間構造 (モデル構成)**  
**属性情報 数量情報**  
**オブジェクト (形状モデル)**

Duplex Apartment 2.skp - SketchUp Pro 2018  
 File Edit View Camera Draw Tools Window Extensions Help  
 1 General View 2 without Walls 3 BS1 Plan 4 BS2 Plan 5 Space Layout 6 Facility General Profile Space BS1 Space BS2 Space Roof Zone A Zone B Fun  
 Default Tray  
 Outliner  
 Filter:  
 Duplex Apartment 2  
 <skp2109>  
 IfcProject - 0001 <1xS3BCK291UvhgP2a6eFl>  
 IfcSite - Default <1xS3BCK291UvhgP2a6eFlN>  
 IfcBuilding <1xS3BCK291UvhgP2a6eFlK>  
 IfcBuildingStorey - Level 1 <1xS3BCK291UvhgP2dvNMKI>  
 IfcBuildingStorey - Level 2 <1xS3BCK291UvhgP2dvNMQJ>  
 <A202>  
 <A203>  
 <A204>  
 <B202>  
 <B203>  
 <B204>  
 IfcBeam - M\_W-Wide Flange:W410X60:W410X60:209121 <2OrV>  
 IfcBeam - M\_W-Wide Flange:W410X60:W410X60:209166 <2OrV>  
 IfcBeam - M\_W-Wide Flange:W410X60:W410X60:209262 <2OrV>  
 IfcBeam - M\_W-Wide Flange:W410X60:W410X60:209263 <2OrV>  
 IfcBuildingElementProxy - Compound Ceiling:Gypsum Board:1876  
 IfcBuildingElementProxy - Compound Ceiling:Gypsum Board:1876  
 IfcBuildingElementProxy - Compound Ceiling:Gypsum Board:1876  
 IfcBuildingElementProxy - Compound Ceiling:Gypsum Board:1876  
 IfcBuildingElementProxy - Compound Ceiling:Gypsum Board:1876  
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 IfcBuildingElementProxy - Compound Ceiling:Gypsum Board:1876  
 IfcBuildingElementProxy - Compound Ceiling:Gypsum Board:1876  
 IfcBuildingElementProxy - Compound Ceiling:Gypsum Board:1876  
 IfcDoor - M\_Single-Flush:0762 x 2032mm:0762 x 2032mm:20372  
 IfcDoor - M\_Single-Flush:0762 x 2032mm:0762 x 2032mm:20403  
 IfcDoor - M\_Single-Flush:0864 x 2032mm:0864 x 2032mm:15037  
 IfcDoor - M\_Single-Flush:0864 x 2032mm:0864 x 2032mm:15047  
 IfcDoor - M\_Single-Flush:0864 x 2032mm:0864 x 2032mm:15973  
 IfcDoor - M\_Single-Flush:0864 x 2032mm:0864 x 2032mm:15983  
 IfcDoor - M\_Single-Flush:0864 x 2032mm:0864 x 2032mm:16006  
 IfcDoor - M\_Single-Flush:0864 x 2032mm:0864 x 2032mm:16020  
 IfcSlab - Floor:Finish Floor - Ceramic Tile:169772 <2OBrcmyk58N>  
 IfcSlab - Floor:Finish Floor - Ceramic Tile:169866 <2OBrcmyk58N>  
 IfcSlab - Floor:Finish Floor - Wood:169093 <2OBrcmyk58NupXoV>  
 IfcSlab - Floor:Finish Floor - Wood:169188 <2OBrcmyk58NupXoV>  
 IfcSlab - Floor:Finish Floor - Wood:169308 <2OBrcmyk58NupXoV>  
 IfcSlab - Floor:Finish Floor - Wood:169354 <2OBrcmyk58NupXoV>  
 IfcSlab - Floor:Finish Floor - Wood:169395 <2OBrcmyk58NupXoV>  
 IfcSlab - Floor:Finish Floor - Wood:169701 <2OBrcmyk58NupXoV>  
 IfcSlab - Floor:Residential - Wood Joist with Subflooring:144800  
 IfcSlab - Floor:Residential - Wood Joist with Subflooring:144872  
 IfcWall - Basic Wall:Party Wall - CMU Residential Unit Dimising W

Component Options  
 IfcBeam M\_WWide  
 Flange:W410X60:W410X60:209121  
 Simplify:   
 IFC 2x3: IfcBeam  
 Description  
 Name  
 IfcLabel M\_W-Wide Flange:W410X60:W410X60:209121  
 ObjectType  
 PSet\_BeamCommon  
 PSet\_Revit\_Analytical Model  
 PSet\_Revit\_Constraints  
 PSet\_Revit\_Construction  
 PSet\_Revit\_Dimensions  
 PSet\_Revit\_Materials and Finishes  
 Beam Material Metal - Steel - 345 MPa  
 PSet\_Revit\_Other  
 PSet\_Revit\_Phasing  
 Apply  
 Measurements

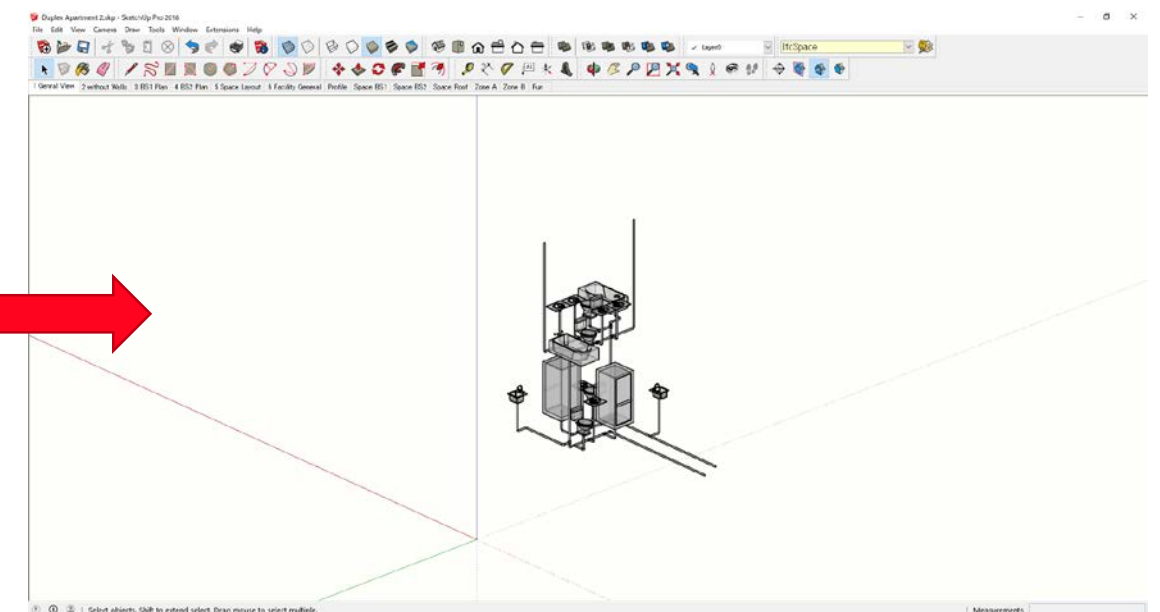
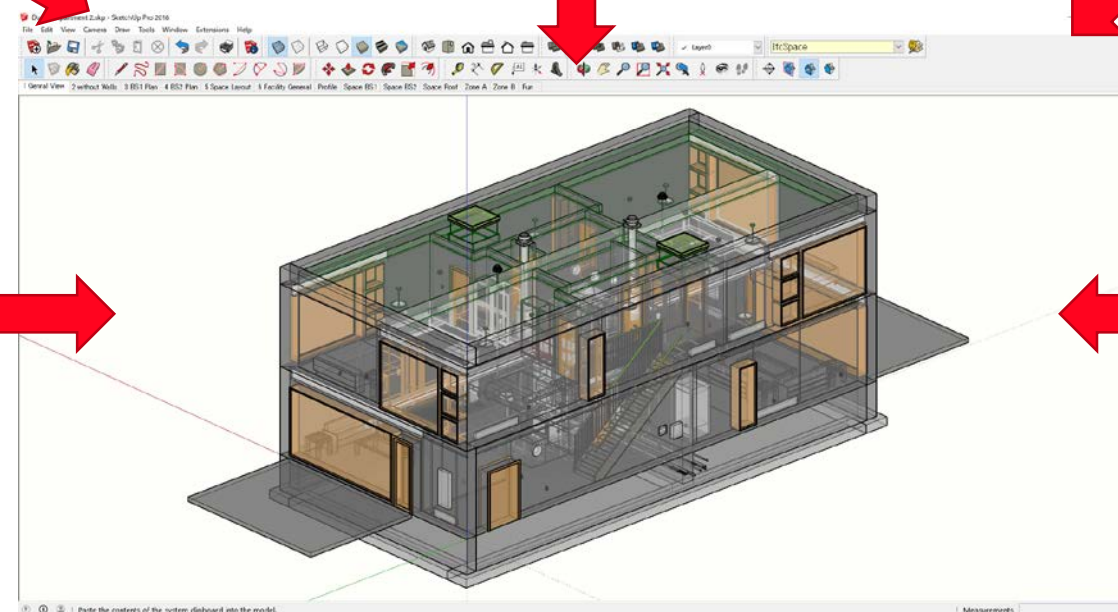
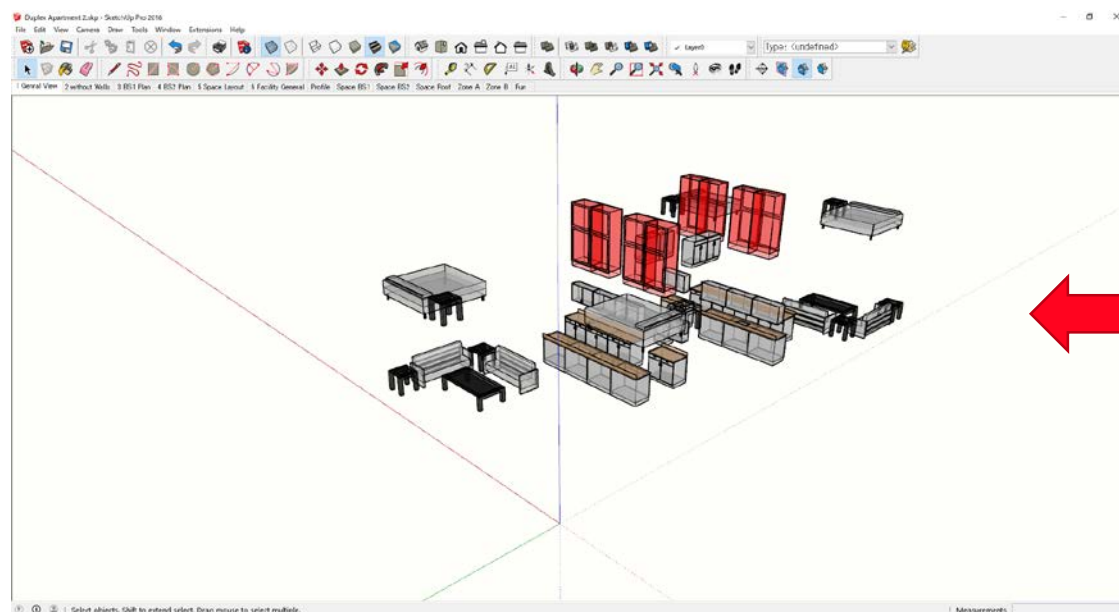
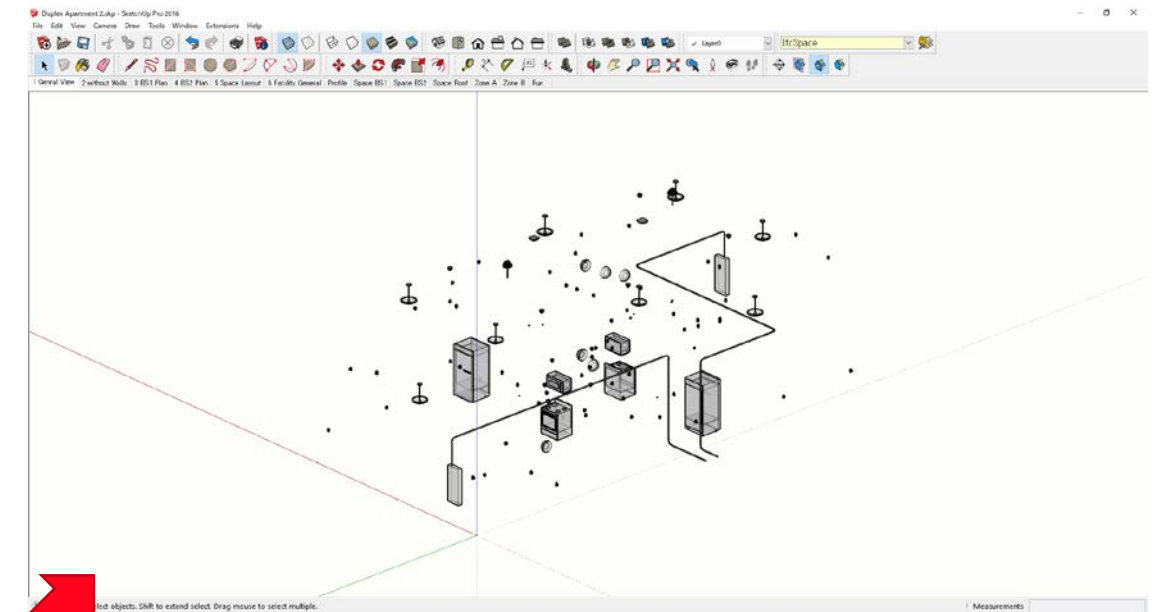
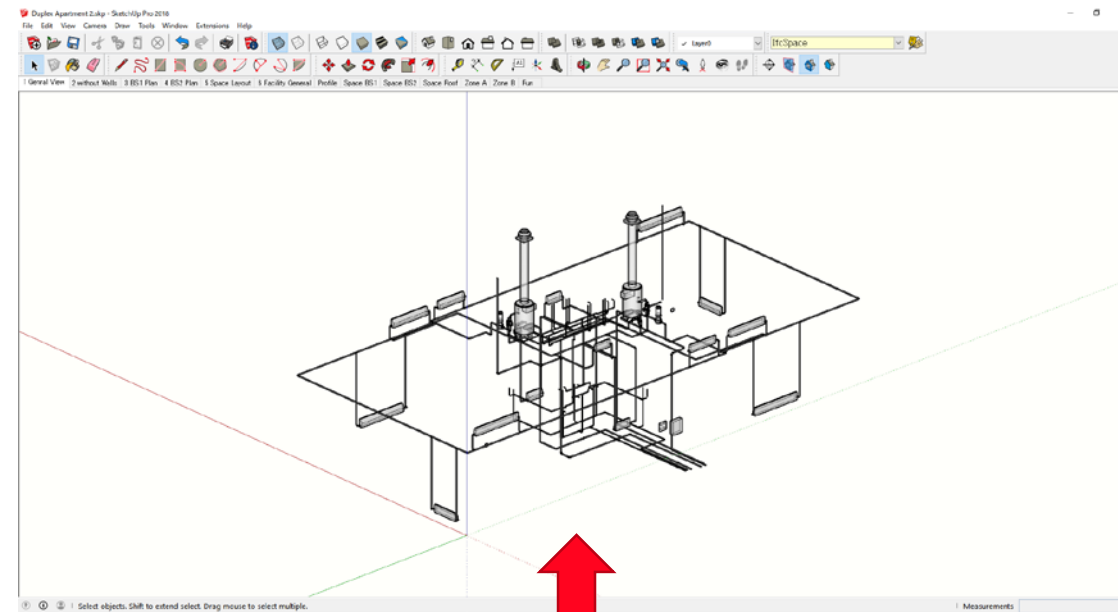
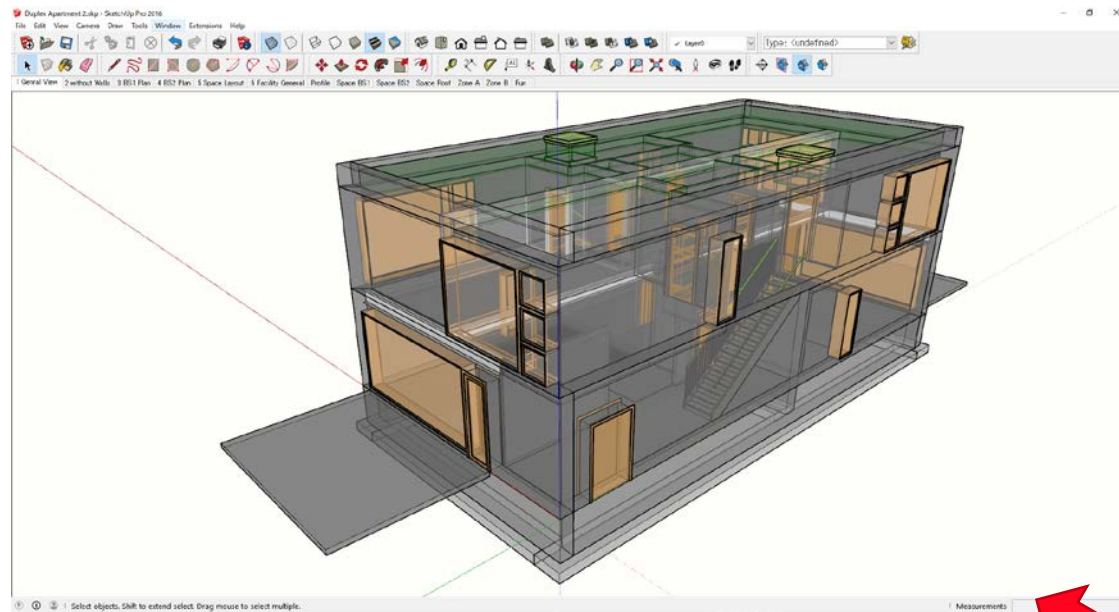


# IFC 様々なモデル

構造

熱供給

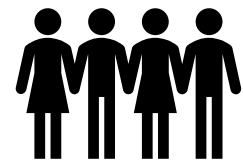
電気



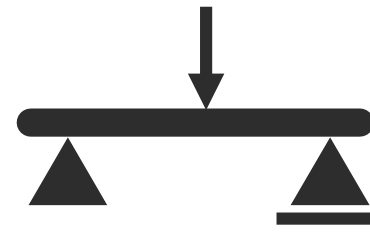
家具類

結合

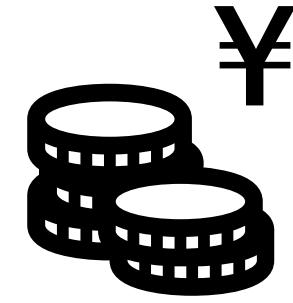
給排水



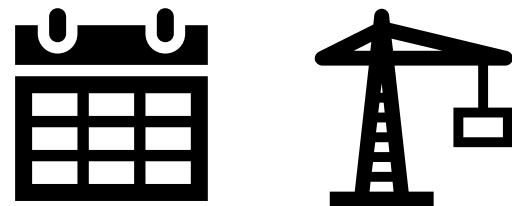
アクター  
(人、組織)



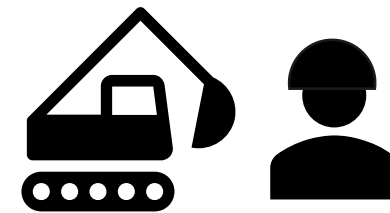
構造解析モデル



コスト



工程、時間

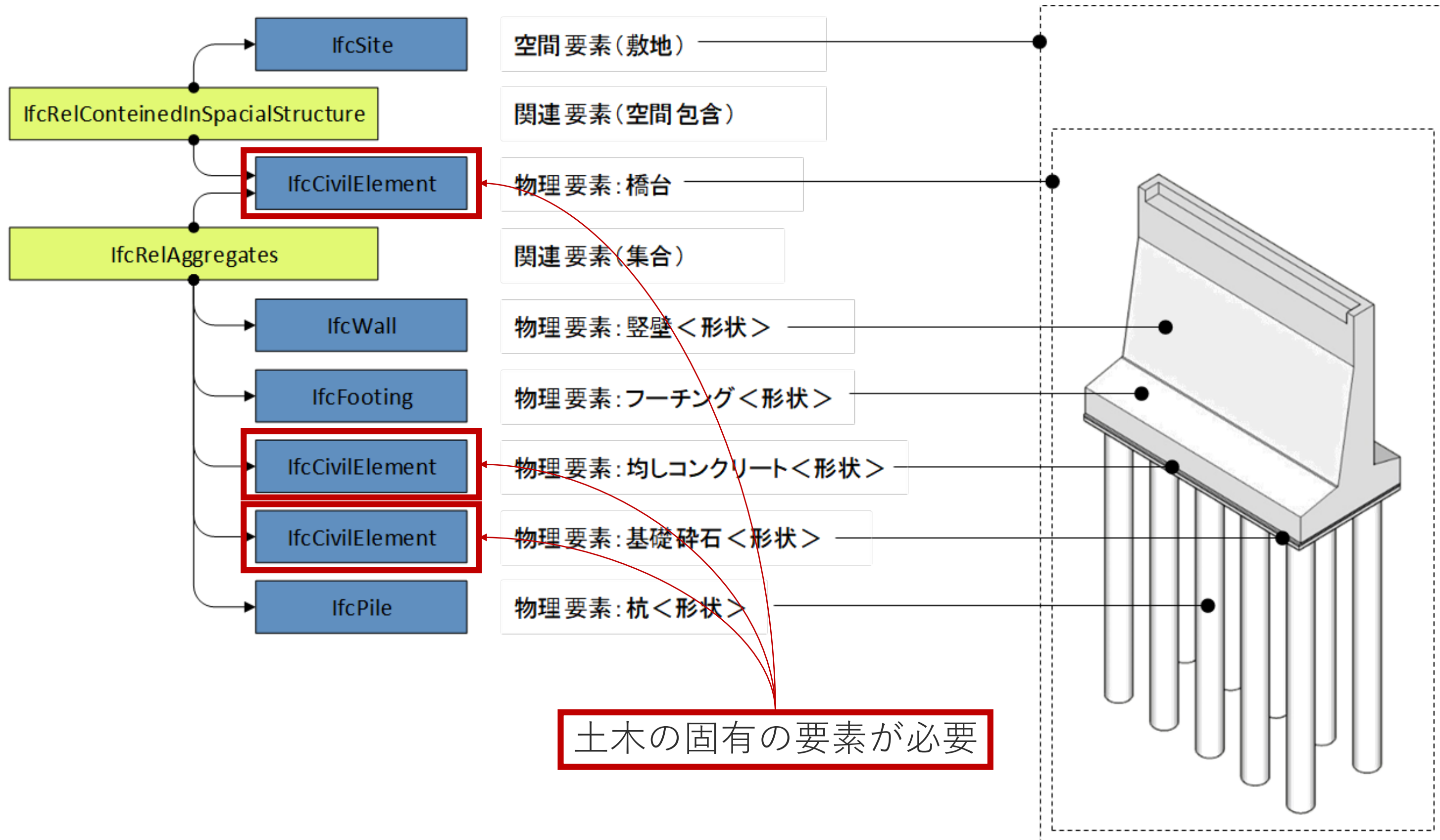


機械、労働力



材質

# IFC 土木構造物への適用



# MVD

Model View Definition

**建設プロセスのどの場面で  
IFCのどのデータを利用するか決める**

# Coordination View 2.0

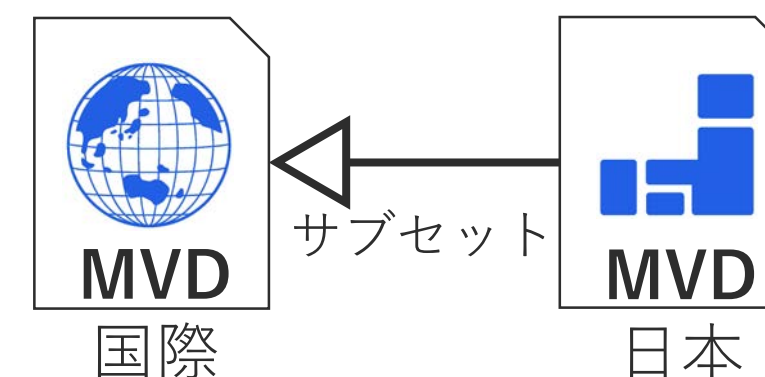
IFC2x3

# Reference View

IFC4

# Design Transfer View

IFC4



comparison of IFC4 RV and DTV entity tables

<http://www.buildingsmart-tech.org/specifications/ifc-view-definition/ifc4-reference-view/comparison-rv-dtv>



# MVD Coordination View 2.0 (bSI) IFC-Beam

Applicability		Specific Concept Description	Req on export			Req on import
Concepts			Architecture	Building Services	Structural	
001	GUIDs	No further restriction of the concept template defined here.	<b>Mandatory</b>		<b>Mandatory</b>	<b>Mandatory</b>
002	History	No further restriction of the concept template defined here.	<i>Optional</i>		<i>Optional</i>	<i>Optional</i>
010	Naming	No further restriction of the concept template defined here.	<b>Mandatory</b>		<b>Mandatory</b>	<b>Mandatory</b>
020	Placement	No further restriction of the concept template defined here.				
020-1	Placement Relative	Specific to IfcBeam: Examples are: (1) placement of the IfcBeam relative to IfcBuildingStorey. (2) placement of the IfcBeam relative to IfcElementAssembly.	<b>Mandatory</b>		<b>Mandatory</b>	<b>Mandatory</b>
030	Geometry	No further restriction of the concept template defined here.				
030-1	Geometry Box	No further restriction of the concept template defined here.	<i>Optional</i>		<i>Optional</i>	<i>Optional</i>
030-2	Geometry Axis	Specific to IfcBeam: The axis shape representation of IfcBeam represents the reference axis of the column (or axis to which the profile is aligned to), it is not required to be the center axis, or the center of gravity axis.	<i>Optional</i>		<i>Optional</i>	<i>Optional</i>
030-6	Geometry Body	No further restriction of the concept template defined here.				
030-6-1	Geometry SweptSolid	Specific to IfcBeam: The following subtypes of IfcProfileDef, that are included in the Coordination View Version 2.0, shall be supported: - for export in exchange requirement "structural": all subtypes of IfcProfileDef; - for export in exchange requirement "Architecture" as minimum the following subtypes of IfcProfileDef: IfcRectangleProfileDef, IfcCircleProfileDef, IfcEllipseProfileDef, IfcArbitraryClosedProfileDef, and IfcArbitraryProfileDefWithVoids. - for import all subtypes of IfcProfileDef shall be supported.	<b>Mandatory</b>		<b>Mandatory</b>	<b>Mandatory</b>
030-6-2	Geometry Clipping	No further restriction of the concept template defined here.	<b>Mandatory</b>		<b>Mandatory</b>	<b>Mandatory</b>
030-6-3	Geometry CSG	No further restriction of the concept template defined here.	<i>Optional</i>		<i>Optional</i>	<b>Mandatory</b>
030-6-5	Geometry Explicit	Specific to IfcBeam: If the IfcBeam has an IfcRelVoidsElement relationship to IfcOpeningElement's, then the explicit geometry shall not be provided by IfcShellBasedSurfaceModel or IfcFaceBasedSurfaceModel.	<i>Optional</i>		<i>Optional</i>	<b>Mandatory</b>
030-6-9	Geometry Mapped	No further restriction of the concept template defined here.	<b>Mandatory</b>		<b>Mandatory</b>	<b>Mandatory</b>
040	Presentation	No further restriction of the concept template defined here.				
040-1	Geometric Presentation	No further restriction of the concept template defined here.	<b>Mandatory</b>		<b>Mandatory</b>	<b>Mandatory</b>
040-2	Material Presentation	Specific to IfcBeam: Since only a single material can be assigned to IfcBeam only a single presentation can be assigned to the complete shape.	<i>Optional</i>		<i>Optional</i>	<b>Mandatory</b>
050	CAD Layer	No further restriction of the concept template defined here.	<b>Mandatory</b>		<b>Mandatory</b>	<b>Mandatory</b>
070	Voiding	No further restriction of the concept template defined here.				
070-1	Voiding Explicit	No further restriction of the concept template defined here.	<i>Optional</i>		<i>Optional</i>	<b>Mandatory</b>
070-2	Voiding Mapped	No further restriction of the concept template defined here.	<i>Optional</i>		<i>Optional</i>	<b>Mandatory</b>
070-3	Voiding SweptSolid	No further restriction of the concept template defined here.	<b>Mandatory</b>		<b>Mandatory</b>	<b>Mandatory</b>
080	Filling	No further restriction of the concept template defined here.				
080-2	Is Filling	Specific to IfcBeam: An IfcBeam shall not be used as a filling object within a void as part of the IfcRelFillsVoid relationship.	<b>Excluded</b>		<b>Excluded</b>	<i>Not relevant</i>
100	Element Aggregation	No further restriction of the concept template defined here.				
100-1	Element Composition	Specific to IfcBeam: Example is a frame, represented by IfcElementAssembly, where the IfcBeam is a part of it.	<i>Optional</i>		<b>Mandatory</b>	<b>Mandatory</b>
100-2	Element Decomposition	Specific to IfcBeam: Example is an elemented IfcBeam that is decomposed into the IfcBeam sections. IfcMember's, IfcFastener's, etc.	<i>Optional</i>		<b>Mandatory</b>	<b>Mandatory</b>
100-4	Port Assignment	Specific to IfcBeam: An IfcBeam shall not have ports assigned.	<b>Excluded</b>		<b>Excluded</b>	<i>Not relevant</i>
110	Connectivity	No further restriction of the concept template defined here.				
110-1	Connectivity Basic	No further restriction of the concept template defined here.	<i>Not relevant</i>		<i>Optional</i>	<i>Optional</i>
110-2	Connectivity Path	Specific to IfcBeam: An IfcBeam shall not be connected using the IfcRelConnectsPathElements relationship.	<b>Excluded</b>		<b>Excluded</b>	<i>Not relevant</i>
110-3	Connectivity Realization	No further restriction of the concept template defined here.				
110-3-1	Connectivity Realized	No further restriction of the concept template defined here.	<i>Not relevant</i>		<i>Optional</i>	<i>Optional</i>
110-3-2	Connectivity Is Realization	Specific to IfcBeam: An IfcBeam shall not be used as a realizing element within an IfcRelConnectsEithRealizingElement relationship.	<b>Excluded</b>		<b>Excluded</b>	<i>Not relevant</i>
120	Spatial Containment	Specific to IfcBeam: It is restricted to be contained in IfcSite, IfcBuilding, or IfcBuildingStorey only. It shall not be provided, if the IfcBeam is part of an aggregation.	<b>Mandatory</b>		<b>Mandatory</b>	<b>Mandatory</b>
130	Grouping	No further restriction of the concept template defined here.				
130-1	Grouping General	No further restriction of the concept template defined here.	<i>Optional</i>		<i>Optional</i>	<i>Optional</i>
130-2	Grouping to Systems	No further restriction of the concept template defined here.	<i>Optional</i>		<i>Optional</i>	<i>Optional</i>
130-3	Grouping to Zones	Specific to IfcBeam: An IfcBeam shall not be grouped into an IfcZone	<b>Excluded</b>		<b>Excluded</b>	<i>Not relevant</i>
200	Material					
200-1	Single Material	Specific to IfcBeam: Only a single material can be applied to the IfcBeam, when a material presentation should be applied (driving the presentation by the material assigned)	<b>Mandatory</b>		<b>Mandatory</b>	<b>Mandatory</b>
200-5	Material List	Specific to IfcBeam: A list of material can be assigned, but there is no correlation between the material and the geometric components. Therefore material presentation information shall not be assigned to material used in the material list.	<i>Optional</i>		<i>Optional</i>	<i>Optional</i>
210	Property Set					
210-1	Property Set IFC Common	Specific to IfcBeam: The common property set is Pset_BeamCommon.	<b>Mandatory</b>		<b>Mandatory</b>	<b>Mandatory</b>
210-2	Property Set IFC any	No further restriction of the concept template defined here.	<b>Mandatory</b>		<b>Mandatory</b>	<b>Mandatory</b>
210-3	Property Set User Defined	No further restriction of the concept template defined here.	<b>Mandatory</b>		<b>Mandatory</b>	<b>Mandatory</b>
230	Classification	No further restriction of the concept template defined here.	<i>Optional</i>		<i>Optional</i>	<i>Optional</i>
300	Type	Specific to IfcBeam: Provision of an association to an IfcBeamType.				
300-1	Type Geometry	No further restriction of the concept template defined here.	<i>Optional</i>		<i>Optional</i>	<b>Mandatory</b>
300-2	Type Naming	No further restriction of the concept template defined here.	<i>Optional</i>		<i>Optional</i>	<b>Mandatory</b>
300-3	Type Material	No further restriction of the concept template defined here.	<i>Optional</i>		<i>Optional</i>	<b>Mandatory</b>
300-5	Type Property Set	No further restriction of the concept template defined here.	<i>Optional</i>		<i>Optional</i>	<b>Mandatory</b>





# MVD IFC2x3 Coordination View2.0

Kernel									A / B
22 / 37									A:MVDの対象のクラス数
Control Extension	Process Extension	Product Extension							B:スキーマで定義しているクラス数
0 / 4	0 / 7	39 / 50							
Shared Building Elements	Shared Bldg Services Elements	Shared Component Elements	Shared Facilities Elements	Shared Management Elements					
33 / 33	24 / 30	8 / 11	0 / 8	0 / 7					
Architecture Domain	Building Control Domain	Construction Management Domain	Electrical Domain	Facilities Management Domain	HVAC Domain	Plumbing Fire Protection Domain	Structural Elements Domain	Structural Analysis Domain	
0 / 3	5 / 5	0 / 7	16 / 19	0 / 8	29 / 31	4 / 4	8 / 10	0 / 27	
Actor Resource	Approval Resource	Constraint Resource	Cost Resource	Date Time Resource	External Reference Resource	Geometric Constraint Resource	Geometric Model Resource	Geometry Resource	
7 / 8	0 / 4	0 / 7	0 / 6	0 / 4	3 / 13	5 / 11	16 / 27	30 / 44	
Material Property Resource	Material Resource	Measure Resource	Presentation Appearance Resource	Presentation Definition Resource	Presentation Dimensioning Resource	Presentation Organization Resource	Presentation Resource	Profile Property Resource	
0 / 13	6 / 6	8 / 10	7 / 32	0 / 18	0 / 17	2 / 10	2 / 11	0 / 8	
Profile Resource	Property Resource	Quantity Resource	Representation Resource	Structural Load Resource	Time Series Resource	Topology Resource	Utility Resource		
21 / 24	9 / 11	0 / 9	11 / 13	0 / 17	0 / 6	9 / 19	2 / 4		

# MVD IFC4 Reference View

Kernel								
27 / 50								
Control Extension	Process Extension	Product Extension						
0 / 3	0 / 11	41 / 57						
Shared Building Elements	Shared Bldg Services Elements	Shared Component Elements	Shared Facilities Elements	Shared Management Elements				
40 / 52	25 / 26	10 / 10	4 / 7	0 / 5				
Architecture Domain	Building Control Domain	Construction Management Domain	Electrical Domain		HVAC Domain	Plumbing Fire Protection Domain	Structural Elements Domain	Structural Analysis Domain
0 / 7	12 / 12	0 / 14	44 / 44		66 / 66	10 / 10	0 / 28	14 / 17
Actor Resource	Approval Resource	Constraint Resource	Cost Resource	Date Time Resource	External Reference Resource	Geometric Constraint Resource	Geometric Model Resource	Geometry Resource
2 / 8	0 / 3	0 / 5	0 / 3	0 / 14	5 / 11	3 / 11	12 / 38	23 / 53
	Material Resource	Measure Resource	Presentation Appearance Resource	Presentation Definition Resource		Presentation Organization Resource		
	8 / 18	10 / 11	15 / 44	1 / 6		1 / 10		
Profile Resource	Property Resource	Quantity Resource	Representation Resource	Structural Load Resource		Topology Resource	Utility Resource	
5 / 27	10 / 14	9 / 9	12 / 17	0 / 20		0 / 20	0 / 5	

A / B

A:MVDの対象のクラス数

B:スキーマで定義しているクラス数

# MVD IFC4 Design Transfer View

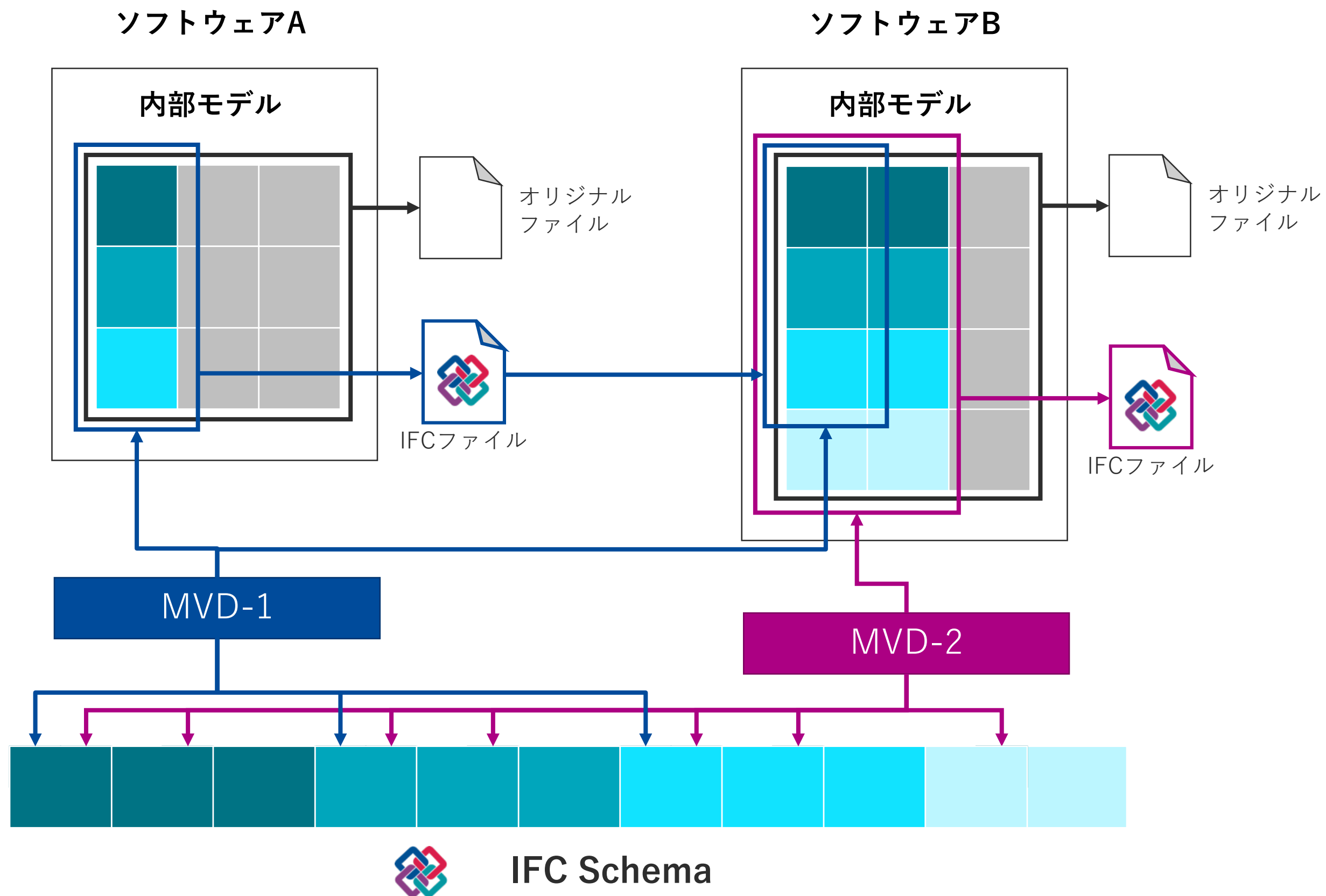
Kernel								
33 / 50								
Control Extension	Process Extension	Product Extension						
0 / 3	0 / 11	47 / 57						
Shared Building Elements	Shared Bldg Services Elements	Shared Component Elements	Shared Facilities Elements	Shared Management Elements				
51 / 52	26 / 26	10 / 10	4 / 7	0 / 5				
Architecture Domain	Building Control Domain	Construction Management Domain	Electrical Domain		HVAC Domain	Plumbing Fire Protection Domain	Structural Elements Domain	Structural Analysis Domain
0 / 7	12 / 12	0 / 14	44 / 44		66 / 66	10 / 10	0 / 28	15 / 17
Actor Resource	Approval Resource	Constraint Resource	Cost Resource	Date Time Resource	External Reference Resource	Geometric Constraint Resource	Geometric Model Resource	Geometry Resource
7 / 8	0 / 3	0 / 5	0 / 3	0 / 14	7 / 11	6 / 11	32 / 38	36 / 53
	Material Resource	Measure Resource	Presentation Appearance Resource	Presentation Definition Resource		Presentation Organization Resource		
	14 / 18	10 / 11	15 / 44	1 / 6		1 / 10		
Profile Resource	Property Resource	Quantity Resource	Representation Resource	Structural Load Resource		Topology Resource	Utility Resource	
21 / 27	10 / 14	9 / 9	15 / 17	0 / 20		17 / 20	2 / 5	

A / B

A:MVDの対象のクラス数

B:スキーマで定義しているクラス数

## オリジナルファイルとIFCファイル



## IFCに関する情報

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- buildingSMART International  
<https://www.buildingsmart.org/>
- buildingSMART-Tech (Model Support Group、Implementation Support Group)  
<http://www.buildingsmart-tech.org/>
- buildingSMART Technical resources for software developers  
<http://www.buildingsmart-tech.org/ifc/>
- buildingSMART Japan  
<https://www.building-smart.or.jp/>

ご清聴ありがとうございました

お問い合わせ

[t.aruga@building-smart.jp](mailto:t.aruga@building-smart.jp)